CATALOGUE
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PENNSYLVANIA BOILER WORKS

ERIE, PA., U.S.A.

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PENNSYLVANIA BOILER WORKS

ERIE, PENNSYLVANIA, U. S. A.

MANUFACTURERS OF

HIGH GRADE STEAM BOILERS

CABLE ADDRESS—PENNA, ERIE.

WESTERN UNION CODE

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PENNSYLVANIA BOILER WORKS, ERIE, PA., U. S. A.

(INCORPORATED UNDER PENNSYLVANIA STATE LAWS, APRIL, 1890).

IN GENERAL

On the succeeding pages will be found cuts and specifications of the regular Boilers we manufacture, and which (with the exception of those listed on pages 20 and 21) we endeavor to have ready for shipment, or have the material on hand out of which to make them, so that prompt shipments are assured.

Specifications given herein are, in a measure, condensed, as is necessary where so many sizes, types and pressures are covered, and if customers are desirous of further details we will be pleased to supply them.

The Boilers herewith described are made throughout of steel having a tensile strength of from 55,000 to 63,000 pounds, a reduction of area of from 45 to 56 per cent., and an elongation of from 22 to 26 per cent. in eight inches, that will turn over cold until the sides are in contact without fracture.

Tubes are from leading mills. Stay Bolts and Braces of the best refined iron. The workmanship is of the best, having the most improved machinery, specially designed for their construction, consisting of Hydraulic Flanging and Riveting Machinery, Heavy Punches, Planers for bevelling before rolling, Rivet Hole Spacing and Punching Machines, Rivet Hole Drilling Machines, Pneumatic Caulkers and Riveters and Electric Traveling Cranes.

In addition to the Boilers described, we are pleased to quote prices on Special Boilers made from Engineers', Architects' and Boiler Insurance Companies' Specifications, for high pressure power service or for low pressure steam and hot water heating.

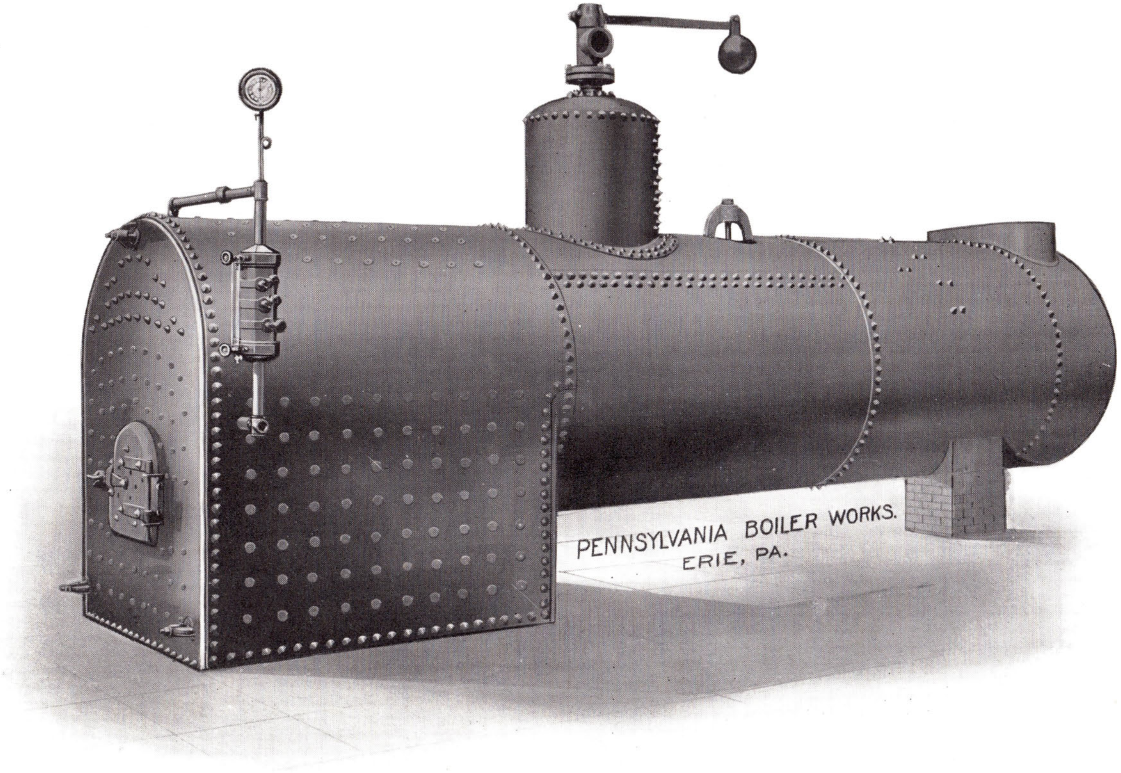
All Boilers are tested at a hydrostatic pressure 50% greater than the intended steam pressure and are also made absolutely steam tight at the pressure under which they are intended to operate.

Our aim in the past has been to make Boilers so good that we would merit a continuation of trade once secured, and we expect to follow the same policy in the future.

We have over 112,000 square feet under roof and have facilities for handling over 20,000 tons of material per year.

INSPECTION AND INSURANCE

Certificates of Inspection or Insurance Policies, or both, issued by a responsible Boiler Insurance Company, will be furnished, if desired, on order, if arranged for at time of ordering Boiler.


PENNSYLVANIA BOILER WORKS.
ERIE, PA.

PORTABLE BOILERS, WITH WATER FRONT AND OPEN BOTTOM FIRE-BOXES

15 to 150 Horse Power.

SPECIFICATIONS OF PORTABLE BOILERS,

With Water Front and Open Bottom Fire-Boxes

FOR 100 AND 125 LBS. WORKING PRESSURE.

Number of Size	**171**	**172**	**173**	**174**	**176**	**178**	**179**	**180**	**182**	**184**	**185**	**186**
Cipher to designate 100 lbs. working press'r	SAFE	SAGE	SALT	SALVE	SAP	SCHOOL	SCORN	SCREW	SEED	SEQUEL	SIGNAL	SLICE
Cipher to designate 125 lbs. working press'r						SPY	STAG	SILVER	SONG	SPIDER	SPADE	SPUR
Horse Power (as usually rated)	15	20	25	30	40	50	60	70	80	100	125	150
Diameter of Boiler ... inches	32	34	36	40	42	44	48	54	56	60	66	66
Length of Fire-Box ... "	38	48	48	48	48	54	60	60	60	60	60	66
Width of Fire-Box ... "	26	28	30	34	36	38	42	48	50	54	60	60
Height of Fire-Box ... "	36	36	36	38	42	44	48	51	52	54	60	60
Number of 3-inch Tubes	24	30	32	38	44	48	54	62	74	88	104	110
Length of Tubes ... inches	84	96	96	96	120	132	138	144	144	168	180	192
Thickness of Steel in Shell ... "	¼	¼	¼	¼	¼	¼	9/32	5/16	11/32	11/32	⅜	⅜
Thickness of Steel in Fire-Box ... "	¼	¼	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of Steel in Heads ... "	⅜	⅜	⅜	⅜	⅜	⅜	⅜	7/16	7/16	7/16	7/16	7/16
Diameter of Dome ... "	16	17	18	18	22	22	26	26	26	30	32	32
Height of Dome ... "	18	20	20	20	24	24	28	28	28	34	32	32
Square Feet of Heating Surface	177	235	258	302	416	505	604	705	815	1094	1380	1527
Diameter of Smoke Stack ... inches	15	16	18	20	20	22	24	24	26	30	32	32
Height of Smoke Stack ... feet	24	24	24	24	30	36	40	40	40	46	50	55
Weight of Bare Boiler, 100 lbs. pressure	3600	4400	4850	5300	6550	7650	9000	11000	12300	14800	17800	19500
Weight of Bare Boiler, 125 lbs. pressure	——	——	——	——	——	8100	9600	11700	13200	16100	18800	21000
Weight of Boiler Fixtures	750	800	850	1000	1150	1350	1500	1550	1700	2500	2700	3000

With Hand Holes in suitable places; No Man Hole in Shell of Boilers 50 horse power and smaller.

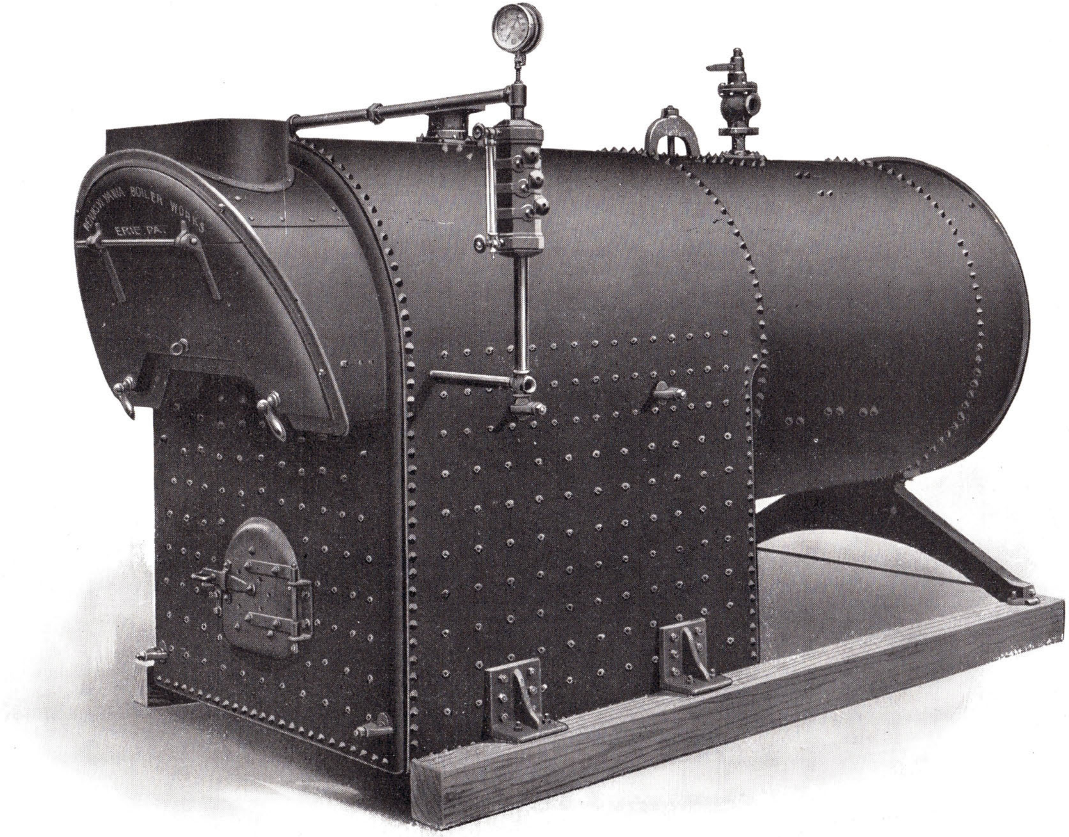
All Boilers will have the Dome on the Shell, as shown in cut, except the 15 and 20 horse powers, which will have it over fire-box.

Longitudinal Seams in 100 lb. pressure Boilers double riveted and in 125 lb. pressure Boilers triple riveted butt strapped; 25 per cent. more stay bolting and bracing in the 125 lb. working pressure than in the 100 lb. working pressure.

Boilers 60 horse power and larger have the dome double riveted to Shell.

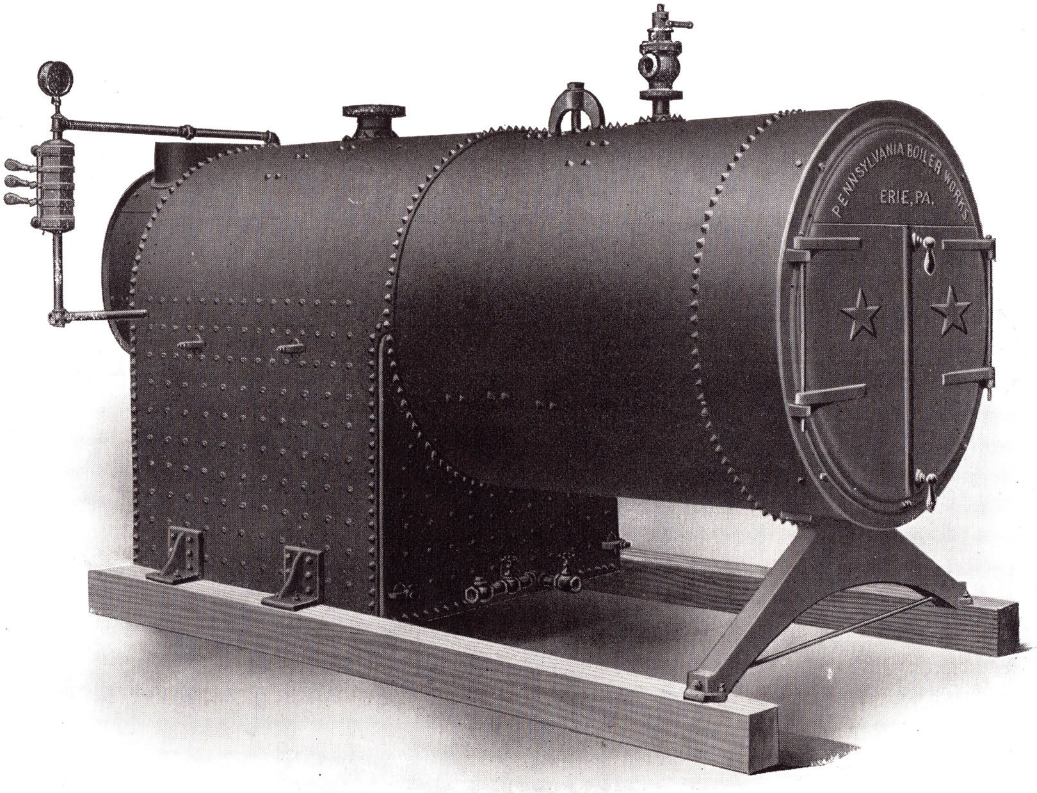
This style Boiler is not regularly mounted on skids, but will be so mounted to order; when so mounted, sizes up to 70 H. P. will have two feet and one leg; 70, 80 and 100 H. P. two feet and two legs; larger sizes four feet and two legs.

Boiler Fixtures comprise: Smoke Stack of No. 16 Steel up to and including 80 horse power; larger of No. 14 Steel; Galvanized Iron Guy Wires (four times the length of Stack); Grates; Safety Valve, (either Ball and Lever or Pop); Water Column attached to Boiler, with Water Gauge, Gauge Cocks and Steam Gauge attached; Blow-off Valve, Feed Valve and Check Valve.


PENNSYLVANIA BOILER WORKS
ERIE, PA.

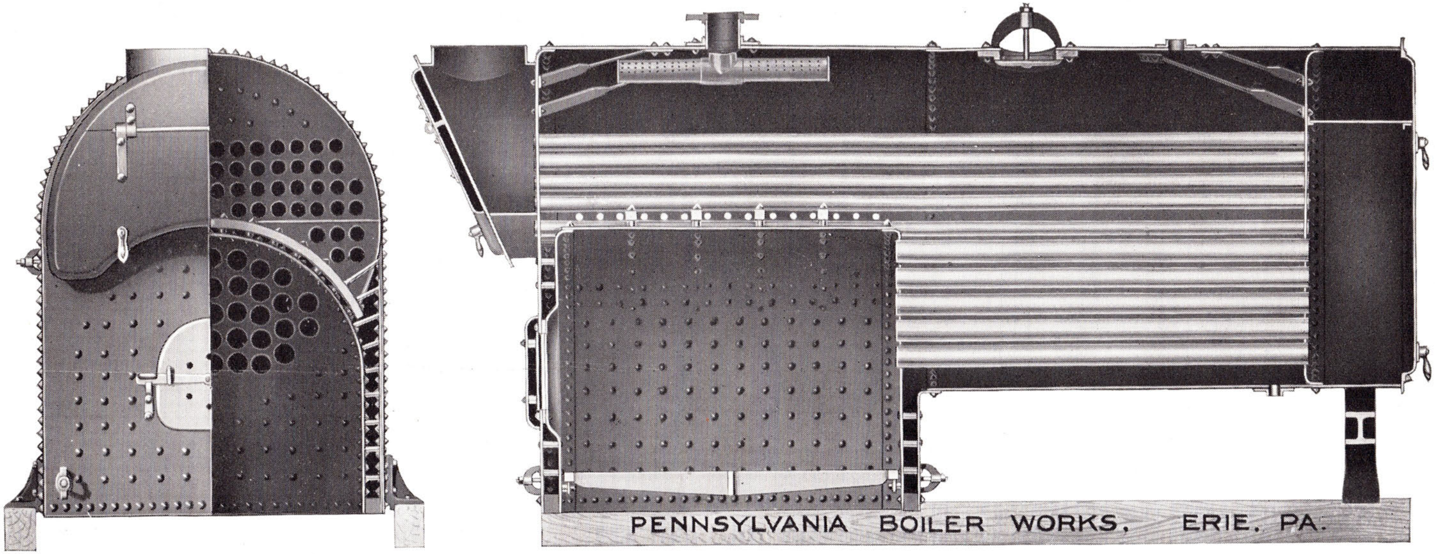
THE PENNSYLVANIA

For Specifications see Pages 6 and 7.


PENNSYLVANIA BOILER WORKS
ERIE, PA.

THE PENNSYLVANIA

For Specifications see Pages 6 and 7.



INTERIOR VIEW OF THE PENNSYLVANIA RETURN TUBULAR PORTABLE BOILER.

The cuts given herewith represent our "Pennsylvania" Return Tubular Portable Fire-Box Boiler, designed to meet the demand for a boiler combining the desirable features of the ordinary fire-box boilers, and the economy of brick set tubular boilers, without cast or sheet iron fire-boxes or shells lined with fire-brick, which usually give trouble and need early repairs.

The "Pennsylvania" has no cast iron in contact with the heat, excepting the combustion chamber and smoke-box doors, and no fire-brick are used in its construction, the fire-boxes being entirely water lined.

The Fire-boxes are large, with a semi-circular crown sheet, with a good water space above same, as will be seen in the cut; this allows of good combustion and circulation. The heat after leaving the fire-box passes through short 4-inch tubes to the rear combustion chamber, thence through longer 3-inch tubes to the smoke-box and stack, leaving the escaping gases at a low temperature.

The Horse Power ratings are based on nearly 12 square feet of heating surface to the horse power, and are uniform throughout the different sizes, as is also the ratio of grate to heating surface.

The tubes are spaced where possible, in vertical and horizontal rows, to allow good circulation.

Being economical in the use of fuel, they are especially desirable in localities where fuel is expensive and a portable type of boiler is desired, and one on which repairs are not frequent. They are also very well adapted for heating purposes, as they contain a maximum amount of heating surface in a minimum space, are very rapid steamers and when properly housed and covered are very economical in the use of fuel.

SPECIFICATIONS OF PENNSYLVANIA RETURN TUBULAR PORTABLE BOILERS.

FOR 100 AND 125 LBS. WORKING PRESSURE.

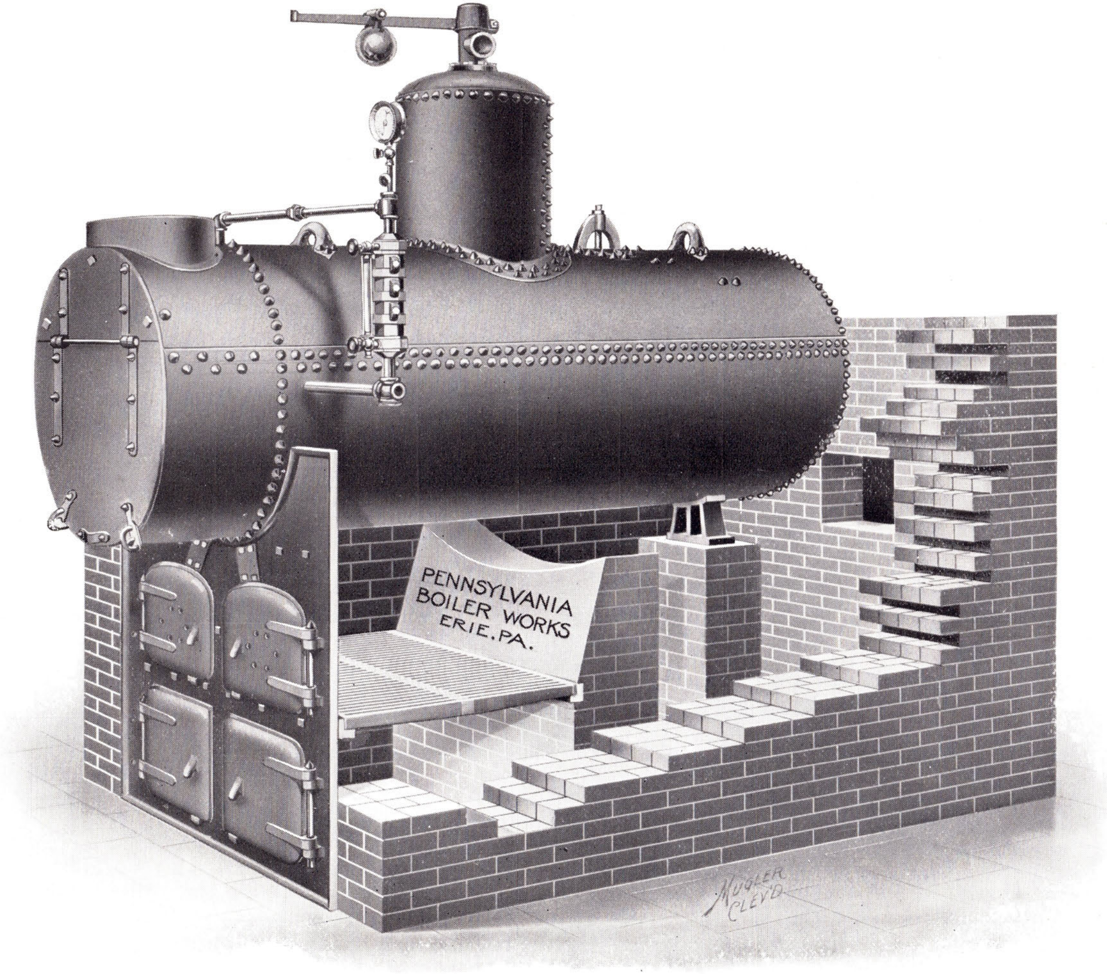
Number of Size	1	3	4	5	6	7	8	10	11	12
Cipher to designate 100 lbs. working press'e	MAINE	DELAWARE	MARYLAND	VIRGINIA	OHIO	TEXAS	UTAH	GEORGIA	VERMONT	NEVADA
Cipher to designate 125 lbs. working press'e				MOROCCO	PERU	BRAZIL	MEXICO	BOLIVIA	PANAMA	COLOMBIA
Horse Power (as usually rated,)	20	30	40	50	60	70	80	100	125	150
Diameter of Boiler . . . . . . inches	42	48	52	56	60	60	66	72	72	72
Length of Fire-Box . . . . . . “	42	42	52	54	60	60	60	60	60	66
Width of Fire-Box . . . . . . “	36	42	46	50	54	54	60	66	66	66
Number of 3-inch Tubes	22	30	40	50	58	58	68	82	82	82
Length of 3-inch Tubes . . . . . . inches	96	108	114	114	120	132	132	138	162	180
Number of 4-inch Tubes	12	16	20	28	32	32	37	46	46	46
Length of 4-inch Tubes . . . . . . inches	50	62	58	56	56	68	68	74	98	110
Square Feet of Heating Surface	240	360	475	590	710	787	910	1140	1365	1510
Square Feet of Grate Surface	10½	12¼	16½	19	22½	22½	25	27½	27½	30¼
Thickness of Shell . . . . . . inches	¼	9/32	5/16	11/32	11/32	11/32	⅜	7/16	7/16	7/16
Thickness of Furnace . . . . . . “	⅜	5/16	5/16	5/16	⅜	⅜	⅜	7/16	7/16	7/16
Thickness of Heads . . . . . . “	⅜	⅜	⅜	⅜	7/16	7/16	7/16	½	½	½
Diameter of Stack . . . . . . “	16	18	20	22	24	24	26	28	28	28
Length of Stack . . . . . . feet	35	45	50	50	50	60	60	60	60	60
Weight of Bare Boiler, 100 lb. pressure	5300	7400	8700	10000	11600	12500	15100	18600	20500	22500
Weight of Bare Boiler, 125 lb. pressure				10400	12100	13000	15800	19400	21400	23500
Weight of Fixtures, either pressure	1100	1400	1700	1900	2100	2300	2500	2700	2700	3000
Size of Drum, if ordered	18″x24″	20″x28″	20″x28″	22″x30″	24″x32″	24″x32″	26″x36″	30″x40″	30″x40″	30″x40″
Weight of Drum	250	300	300	350	400	400	500	600	600	600

With the bare boiler is furnished the necessary castings and skids for support, two feet and one leg on sizes up to 80 H. P., four feet and one leg 80 H. P. to 125 H. P., four feet and two legs 125 and 150 H. P. Cast Iron Smoke Box and Combustion Chamber Doors, except No. 1, which has Wrought Iron Door; Wrought Iron Lined Fire Door; 50 H. P. and larger are furnished with Man Hole in Shell, as shown by cut, smaller sizes are without Man Hole.

Hand-holes at bottom corners of Fire-box, on sides near crown sheet and in front head in line with crown sheet. Longitudinal Seams, double riveted in 100 lb. pressure Boilers, and triple riveted butt strapped for 125 lb. pressure Boilers; 25 per cent. more bracing and stay bolting in the 125 lb. working pressure than in the 100 lb. W. P.

Boiler Fixtures comprise: Stack of No. 16 Steel and Galvanized Iron Guy Wires (four times length); Grates and Bearers; Pop Safety Valve; Water Column attached to Boiler with Water Gauge, Gauge Cocks and Steam Gauge attached; Blow-off Valve, Feed Valve and Check Valve.

Cast Iron Ash Pit Front with Doors (see cut No. 8, page 29), furnished to order. Boilers up to and including No. 8 have Semi-Steel Mud Rings, larger sizes have Forged Wrought Iron Mud Rings. Fire Door Ring in all sizes made of boiler plate steel without welds.


PENNSYLVANIA
BOILER WORKS
ERIE, PA.
MUGLER
CLEV'D

STATIONARY BOILERS, WITH SMOKE BOXES AND HALF FRONT.

For Specifications see Page 9.

SPECIFICATIONS OF STATIONARY BOILERS FOR HALF FRONT SETTING

FOR 100 LBS. WORKING PRESSURE.

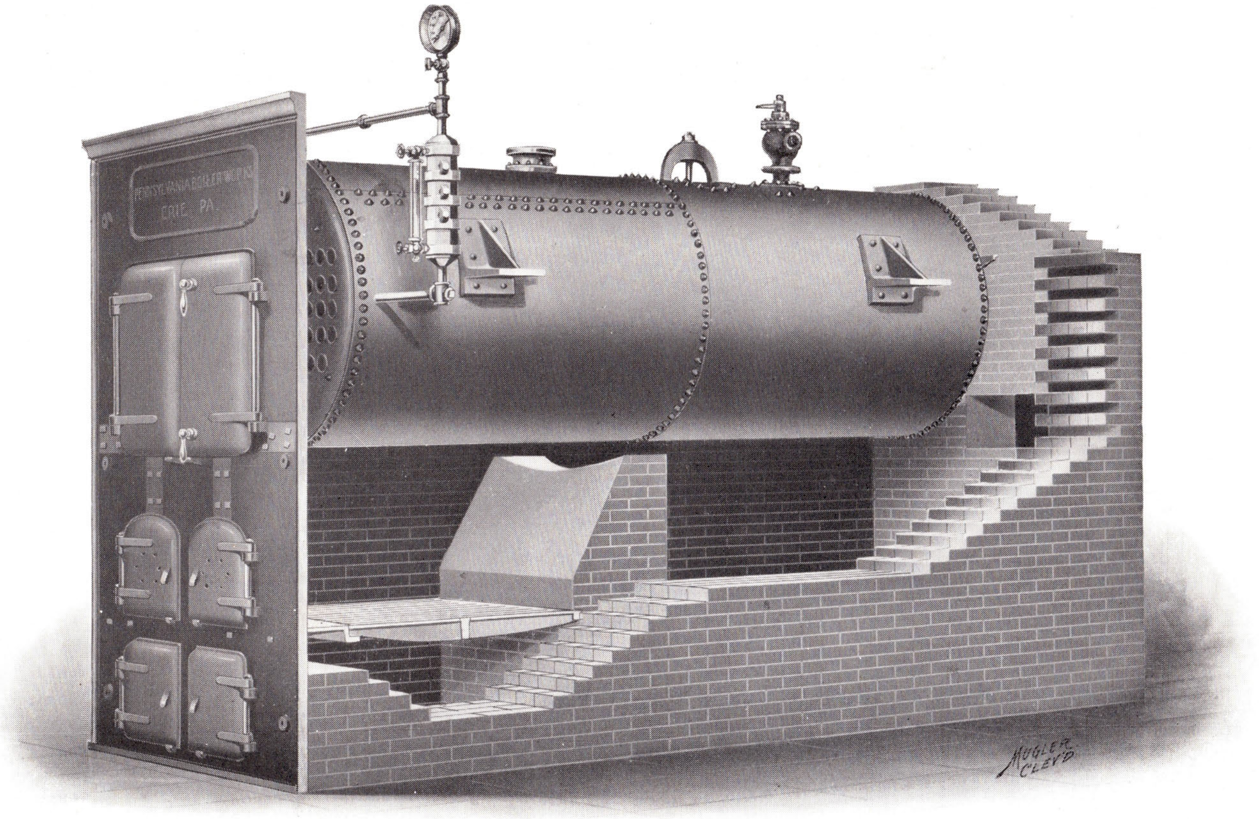
Number of Size	1	2	3	4	5	6	7	8
Cipher to designate	MAJOR	MALT	MAN	MASH	MAT	MATCH	MEAN	MELON
Horse Power (as usually rated)	**15**	**20**	**25**	**25**	**30**	**30**	**35**	**40**
Diameter of Boiler . . . inches	**36**	**36**	**36**	**42**	**42**	**44**	**44**	**44**
Length of Tubes (all 3-inch) . . . feet	8	10	12	10	12	10	12	14
Number of Tubes	26	26	26	36	36	44	44	44
Square Feet Heating Surface	210	260	310	350	415	415	500	575
Diameter of Dome . . . inches	20	20	20	22	22	22	22	22
Height of Dome . . . "	22	22	22	24	24	24	24	24
Thickness of Steel in Shell of Boiler . . . "	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Thickness of Steel in Heads of Boiler . . . "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Thickness of Steel in Shell of Dome . . . "	1/4	1/4	1/4	9/32	9/32	9/32	9/32	9/32
Thickness of Steel in Head of Dome . . . "	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8
Diameter of Stack . . . "	16	16	16	18	18	20	20	20
Length of Stack . . . feet	24	30	36	30	36	30	36	40
Weight of Boiler, without Fixtures . . . about	2450	2900	3300	3700	4200	4200	4800	5300
Weight of Boiler Fixtures . . . about	1650	1800	2000	2100	2200	2200	2300	2500
Weight of Boiler and Fixtures . . . about	4100	4700	5300	5800	6400	6400	7100	7800

Fixtures as regularly furnished comprise: Half-Arch Front ("B", page 26), with Casings for Fire-brick and Liners for Fire Doors; Grates and Bearers; Rear Arch Bars (No. 19 and 21, Page 29); Cleaning Door and Frame; Boiler Stand; Safety Valve (Ball and Lever or Pop); Water Column attached to boiler, with Water Gauge, Gauge Cocks and Steam Gauge attached; Blow-off Valve, Feed Valve, Check Valve, Smoke Stack, No. 16 Gauge Steel, and Galvanized Guy Wires (four times the length of stack).

Grates 36 inches long are furnished with Boilers having 8 foot Tubes; 42 inches long, with 10 foot tubes; 48 inches long with 12 foot Tubes; 54 inches long with 14 foot Tubes; and in width equal to the diameter of the Boiler.

Binder Bars and Rods, Anchor Bolts, Injectors and Firing Tools are not a part of the fixtures as regularly furnished, but are subject to order.

Boilers are made Seamless Bottom in all sizes; Shell extended to form Smoke Box, fitted with Steel Smoke Box Door and Stack Saddle; 4 x 6 hand hole in front head above tubes and 3 x 4 hand hole in each head below tubes, except Boilers 10 feet and shorter, no hand hole in rear head; two pressed steel loops (Cut No. 5, page 29), riveted on top of Boilers; Domes single riveted to Boiler Shell; no man hole except to order and at an additional price.


PENNSYLVANIA BOILER WORKS
ERIE, PA.
MUGLER CLEV'D

STATIONARY BOILERS WITH FLUSH ENDS AND FULL FRONTS

For Specifications see Page 11.

SPECIFICATIONS OF STATIONARY BOILERS FOR FULL AND HALF FRONT SETTING.

FOR 100 LBS. WORKING PRESSURE.

Number of Size	39	40	41	42	43	45	46	47	49	52	53	54	55	56	57
Cipher to designate Full Front Boiler	JELLY	JASPER	JOY	JENNY	JEHU	JEST	JERRY	JEWEL	JEW	JOHN	JAKE	JOWL	JUMP	JUNE	JURY
Cipher to designate Half Front Boiler	JESSEE	JETTY	JUDGE	JIG	JACK	JADE	JILL	JUICE	JAG	JAIL	JUTE	JAM	JAY	JULY	JUMBO
Horse Power (as usually rated,	40	45	50	50	60	70	60	70	80	100	115	125	150	175	200
Diameter of Boiler inches	48	48	48	54	54	54	60	60	60	66	66	72	72	78	78
Length of Tubes feet	12	14	16	12	14	16	12	14	16	16	18	16	18	18	20
Number of Tubes 3-inch dia	42	42	42	56	56	56	72	72	....	....	....	....	....	....	....
Number of Tubes 4-inch dia	....	....	....	....	....	....	....	....	44	54	54	70	70	86	86
Thickness of Shell inches	9/32	9/32	9/32	5/16	5/16	5/16	11/32	11/32	11/32	3/8	3/8	7/16	7/16	15/32	15/32
Thickness of Heads inches	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	1/2	1/2	1/2	1/2
Diameter of Smoke Stack "	22	22	22	26	26	26	28	28	28	30	30	34	34	38	38
Length of Smoke Stack feet	36	40	50	36	40	50	36	40	50	50	55	50	55	55	60
Weight of Bare Flush End Boiler	5800	6400	7000	7000	7600	8400	8300	9200	10300	12200	13600	15100	16900	21500	23500
Weight of Full Front Fixtures	3700	3800	4000	4200	4300	4500	4600	4800	5200	5800	6000	6500	6700	7900	8300
Complete weight Boiler and Fixtures	9500	10200	11000	11200	11900	12900	12900	14000	15500	18000	19600	21600	23600	29400	31800
Weight Bare Boiler and Smoke Box	6200	6800	7400	7200	8100	8900	8900	9800	10900	12900	14900	15900	17700	22300	24300
Weight of Half Front Fixtures	2700	2800	3000	3000	3200	3400	3400	3700	3800	4200	4500	4800	5200	6300	6700
Complete weight Boiler and Fixtures	8900	9600	10400	10200	11300	12300	12300	13500	14700	17100	19400	20700	23000	28600	31000

Horizontal Seams, lap double riveted; Boilers up to eighteen feet long made in two circular courses per cut, eighteen feet and longer made in three courses. Man hole in Shell and one in front head below Tubes, no hand hole in rear head. Four Wall Brackets riveted to Shell. Nozzle for Steam Outlet, Flange for Safety Valve and Blow-off, tapped openings for Water Column; Heads braced with crow foot braces above Tubes and through braces below Tubes, riveted over at each end.

For changes in number and size of Tubes, see page 15.

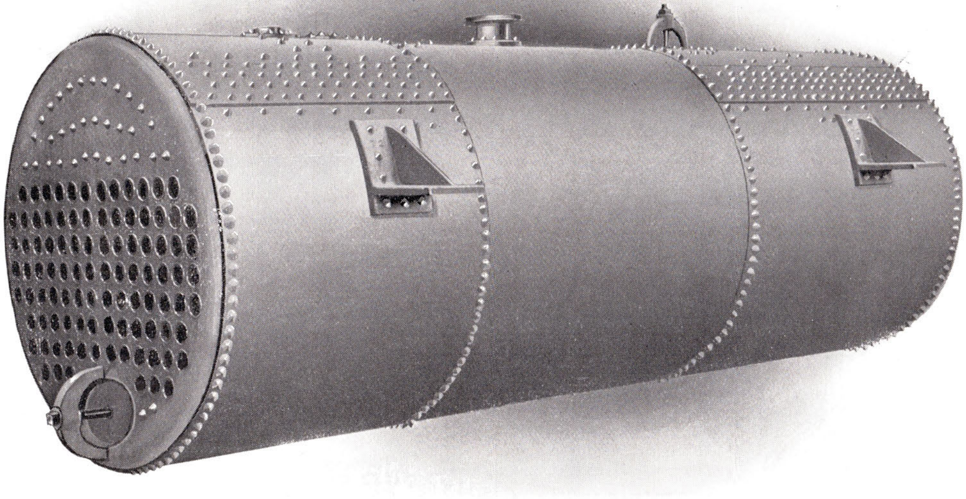
Boilers up to and including 60 inch x 16 feet can be made with Seamless Bottom when so specified in order.

Where Half-Front Setting is desired, we will bolt to the Front Head a Smoke Box of ¼ inch steel with ¼ inch Steel Door (No. 2, Page 29), and Smoke Stack Saddle (No. 4, Page 29), and supply a Half-Front in place of the Full Front, Wall Brackets being furnished with these Boilers for either Full or Half Front Setting.

Fixtures as regularly furnished comprise: Full Arch Front "D" or "E" (Cut, Page 24), with Flue, Fire and Ash Doors, Liners for Fire Doors (No. 10, Page 29), Dead Plate (No. 12, Page 29), Oval Stack Plate (No. 3, Page 29); Skeleton Rear Arch Bars and Bearer (No. 19 and 21, Page 29); Cleaning Door and Frame; Grates and Bearer; Pop Safety Valve; Water Column attached to Boiler with Water Gauge, Gauge Cocks and Steam Gauge attached; Blow-off Valve, Feed Valve, Check Valve and Smoke Stack with Galvanized Guy Wires (Four times the length of Stack).

Grates 48 inches long furnished with Boiler having 12 foot Tubes; 54 inches long, with 14 and 16 foot Tubes; 60 inches long, with 18 foot Tubes; 66 inches long, with 20 foot Tubes, and in width equal to the diameter of the Boiler. Smoke Stacks as regularly furnished up to and including 28 inches in diameter will be made of No. 16 gauge steel; 30 to 34 inches diameter, of No. 14 gauge steel; and larger than 34 inches diameter, of No. 12 gauge steel.

Binder Bars and Rods, Anchor Bolts, Flame or Arch Plates (No. 15, Page 29), Wall Plates and Rollers, Injectors and Firing Tools, are not a part of regular fixtures and are subject to order.



STATIONARY BOILER DESIGNED FOR 125 AND 150 POUNDS WORKING PRESSURE

For Specifications see Pages 13 and 14.

SPECIFICATIONS OF STATIONARY BOILERS FOR FULL AND HALF FRONT SETTING.

FOR 125 LBS. WORKING PRESSURE.

Number of Size	49-H	52-H	53-H	54-H	55-H	56-H	57-H
Cipher to designate Flush End Boiler	IRON	IMP	INK	IRIS	ITCH	INGOT	INFANT
Cipher to designate with ¼-inch Smoke Box	IVY	IBEX	INCA	ICE	IDOL	IVORY	INDIGO
Horse Power (as usually rated)	80	100	115	125	150	175	200
Diameter of Boiler inches	60	66	66	72	72	78	78
Length of Tubes feet	16	16	18	16	18	18	20
Number of Tubes (all 4-inch dia.)	44	54	54	70	70	86	86
Thickness of Shell inches	11/32	3/8	3/8	7/16	7/16	15/32	15/32
Thickness of Heads "	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Thickness of Butt Straps "	5/16	5/16	5/16	3/8	3/8	3/8	3/8
Weight of Bare Flush End Boiler	11000	13000	14200	15900	17700	21500	22500
Weight of Boiler with ¼-inch Bolted Smoke Box	11600	13700	14900	16700	18500	22400	23400

For Full and Half Front Fixtures, see Page 11.

Horizontal Seams, Butt Strapped Triple Riveted; Heads braced with crow foot braces above Tubes and through braces below Tubes, riveted over on ends. Sixteen foot Boilers made in two courses, eighteen and twenty foot in three, as shown by cut; Man hole in Shell and one in Front Head below Tubes, no Hand Hole in rear head; Four heavy Wall Brackets riveted to Shell; Nozzle for Steam Outlet, Flange for Safety Valve as shown by cut, tapped openings for water column connections.

Where Half Front Setting is desired, we will bolt to the Front Head a Smoke Box of ¼ inch steel, with ¼ inch Steel Door (No. 2, Page 29), and Smoke Stack Saddle (No. 4, Page 29), and supply a Half Front in place of the Full Front, Wall Brackets being furnished with these Boilers for either Full or Half Front Setting.

Domes are not furnished except to order.

For Overhead Suspension, see Page 30.

Other sizes, as listed on Page 11, can be furnished for 125 lbs. working pressure, as above constructed, for prompt shipment.

For changes in number and size of Tubes, see Page 15.

SPECIFICATIONS FOR STATIONARY BOILERS FOR FULL AND HALF FRONT SETTING.

FOR 150 LBS. WORKING PRESSURE STANDARD CONSTRUCTION.

See Cut Page 12.

Number of Size	**49-R**	**52-R**	**53-R**	**54-R**	**55-R**	**56-R**	**57-R**
Cipher to designate Flush End Boiler	OIL	OPAL	OPIUM	ORANGE	ORE	ORPHAN	OTTER
Cipher to designate with ¼-inch Smoke Box	OUTLAW	OUNCE	OVEN	OSTRICH	ORCHARD	OLIVE	OCEAN
Horse Power (as usually rated)	**80**	**100**	**115**	**125**	**150**	**175**	**200**
Diameter of Shell	60	66	66	72	72	78	78
Length of Shell and Tubes	16	16	18	16	18	18	20
Number of 4-inch Tubes	44	54	54	70	70	86	86
Thickness of Shell	13/32	7/16	7/16	½	½	17/32	17/32
Thickness of Heads	9/16	9/16	9/16	9/16	9/16	9/16	9/16
Thickness of Butt Straps	⅜	⅜	⅜	⅜	⅜	7/16	7/16
Weight of Bare Flush End Boiler	12400	14600	15900	17500	19500	23500	25400
Weight of Bare Boiler with ¼-inch Bolted Smoke Box	13000	15300	16600	18300	20300	24400	26300

For Full and Half Front Fixtures, see Page 11, Valves and Gauges being suitable for 150 lbs. Working Pressure.

Horizontal Seams, butt strapped and triple riveted; Heads braced with crow foot braces above Tubes and through rods below Tubes, crow foot at rear end, double nuts at front end, cap nuts on outside. Sixteen foot Boilers in two courses, eighteen and twenty foot in three courses as shown in Cut, Page 12; Pressed steel man hole frame in top of Shell and flanged man hole in Front Head below Tubes, no hand hole in rear head; Four Wall Brackets riveted to Shell; Nozzle for steam outlet, flange for Safety Valve and Blow-off, as shown in Cut, Page 12; Tapped Openings for Water Column Connection.

Domes are not furnished, except to order.

When desired to use these Boilers with Half Front Setting, we will bolt to the Front Head a Smoke Box of ¼ inch steel fitted with ¼ inch Steel Door (No. 2, Page 29), and Stack Saddle (No. 4, Page 29), and furnish a Half-Arch Front in place of the Full Front, Wall Brackets being furnished with these Boilers for either Full or Half-Front Setting.

Above list covers only a few of the favorite sizes, but we can furnish other sizes for 150 lbs. working pressure to order.

For Overhead Suspension, see Page 30.

For changes in number and size of Tubes, see Page 15.

CHANGES IN NUMBER AND SIZE OF TUBES IN STATIONARY BOILERS.

WITH OR WITHOUT MAN HOLE IN HEAD.

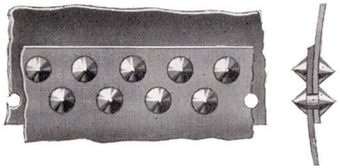
Diameter of Boiler.......................inches	48	54	60	66	72	78	
Number 3 -inch Tubes, Hand hole each head..........	50	64	80	98	120	144	RUBBER.
“ 3 “ “ Man hole in Front head..........	42	56	72	90	112	136	RUGGED.
“ 3½ “ “ Hand hole each head..........	40	50	64	78	96	116	RURAL.
“ 3½ “ “ Man hole in Front head..........	34	44	58	72	90	110	RUSTIC.
“ 4 “ “ Hand hole each head..........	32	40	50	60	76	92	RUMBLE.
“ 4 “ “ Man hole in Front head..........	26	34	44	54	70	86	RUMMAGE.

Customers must indicate on orders, when a different arrangement of Tubes and Man Holes are wanted, than listed for regular Boilers, and when telegraphing by using one of the above ciphers, following cipher name of a regular catalog Boiler will indicate to us the arrangement desired. To illustrate: Desiring to specify a 66 inch x 16 foot Boiler for 100 lbs. working pressure, for full front setting as described on Page 11, but arranged with 90–3 inch tubes, with man hole front head below tubes the ciphers "John Rugged" will cover it.

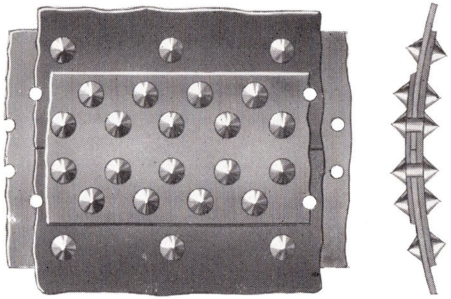
Flanged Man Hole will be placed in Front or Rear Head instead of in Shell, if so ordered, without change in price.

Where Man Hole is placed in Front Head below Tubes, no Hand Hole will be placed in Rear Head, unless ordered.

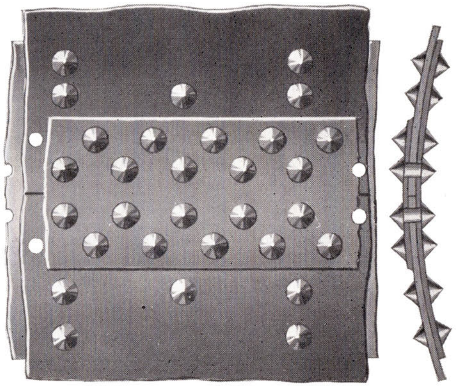
TYPES OF RIVETED JOINTS FOR HORIZONTAL SEAMS.



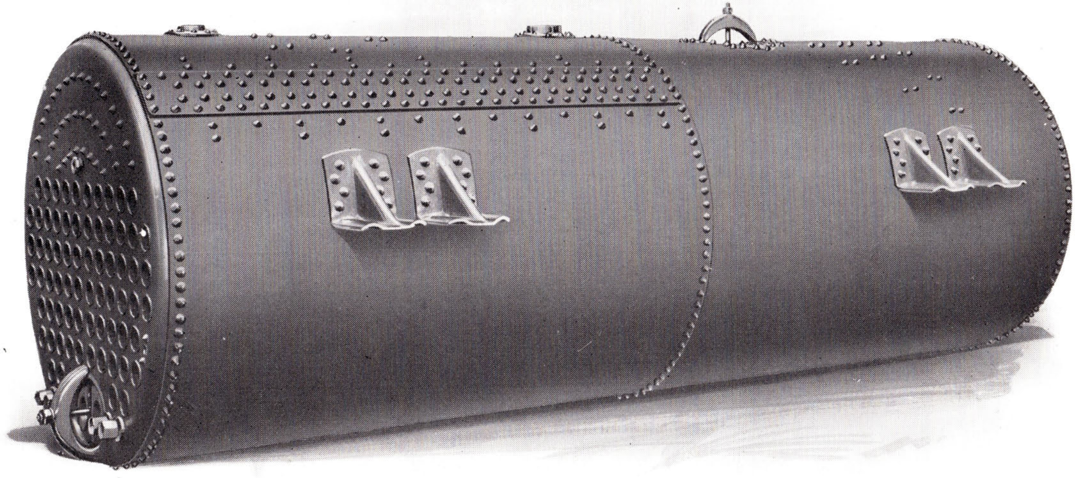
Lap Seam, Double Riveted, gives about 70% of the strength of solid plate.



Butt Strap Seam Triple Riveted, gives about 86% of the strength of solid plate.



Butt Strap Seam Quadruple Riveted, gives about 94% of the strength of solid plate.



HIGH GRADE STATIONARY BOILER DESIGNED FOR 125 AND 150 POUNDS WORKING PRESSURE.

For Specifications see Pages 17 and 18.

SPECIFICATIONS OF STATIONARY BOILERS FOR FULL AND HALF FRONT SETTING.

FOR 125 LBS. WORKING PRESSURE.

Ohio, Massachusetts and Detroit Requirements.

Number of Size	49-S	52-S	53-S	54-S	55-S	56-S	57-S
Cipher to designate Flush End Boiler	PADDLE	PANTHER	PAIL	PIGEON	PICKLE	PLANT	PERCH
Cipher to designate with ¼-inch Smoke Box	PAGAN	PARDON	PALACE	PEDLER	PHOTOGRAPH	PANTRY	PARSON
Horse Power (as usually rated)	80	100	115	125	150	175	200
Diameter of Boiler ... inches	60	66	66	72	72	78	78
Length of Tubes ... feet	16	16	18	16	18	18	20
Number of Tubes (all 4-inch)	44	54	54	70	70	86	86
Thickness of Shell ... inches	⅜	13/32	13/32	7/16	7/16	½	½
Thickness of Heads ... "	½	½	½	½	½	9/16	9/16
Thickness of Butt Straps ... "	5/16	⅜	⅜	⅜	⅜	7/16	7/16
Weight of Bare Flush End Boiler ... about	11500	13600	14900	16000	18000	21900	24300
Weight of Bare Boiler and Smoke Box ... about	12100	14300	15600	16800	18800	22800	25200

For list of Full and Half Front Fixtures, see Page 11; the Valves and Gauges being of high-grade make.

Horizontal Seams Butt Strapped, Quadruple Riveted; Heads braced with Weldless Steel Crow Foot Braces above Tubes and through Braces below Tubes, with Crow Foot at rear end and Double Nuts at Front End, the outside nut being a steel cap nut; Man Hole in Shell, with pressed Steel Frame, double riveted, flanged Man Hole in Front Head below Tubes, each 11 x 15 inch, with pressed steel plate complete; eight pressed steel Wall Brackets riveted on, four on each side, in pairs; Shell made in two circular courses in all sizes; Rivet Holes drilled from the solid, as described on Page 19; Tube Holes punched ½ inch small and reamed to size; Shell of Fire Box Steel, Heads Flange Steel; Pressed Steel Threaded Flange for Steam, Safety Valve and Blow-off Connection and Tapped Openings for Water Column Connection; Dry Pipe fitted under Steam Outlet; Brass Bushing in Front Head with Internal Feed Pipe installed; Fusible Plug in Rear Head.

The above described Boilers will pass inspection in the States of Massachusetts and Ohio and the City of Detroit, Mich., the necessary Data Sheets being registered as required by their Rules.

When desired to use these Boilers with Half Front Setting, we will bolt to the Front Head a Smoke Box of ¼ inch steel, with ¼ inch Steel Door (Cut No. 2, Page 29), and Stack Saddle (No. 4, Page 29), and furnish a Half Front in place of Full Front, Wall Brackets being furnished with either Full or Half Front Setting.

Domes are not furnished except to order.

For Overhead Suspension, see Page 30.

For change in number and size of Tubes, see Page 15.

SPECIFICATIONS FOR STATIONARY BOILERS FOR FULL AND HALF FRONT SETTING.

FOR 150 LBS. WORKING PRESSURE.

Ohio, Massachusetts, and Detroit Requirements. See Cut Page 16.

Number of Size	**49-O**	**52-O**	**53-O**	**54-O**	**55-O**	**56-O**	**57-O**
Cipher to designate Flush End Boiler	PEARL	PENNY	PEPPER	PAINT	PROPHET	PLUM	PURSE
Cipher to designate with ¼-inch Smoke Box	PENCIL	PENSION	PICTURE	PEACH	PYRAMID	POISON	PRUNE
Horse Power (as usually rated)	80	100	115	125	150	175	200
Diameter of Boiler ... inches	60	66	66	72	72	78	78
Length of Tubes ... feet	16	16	18	16	18	18	20
Number of Tubes (all 4-inch)	44	54	54	70	70	86	86
Thickness of Shell ... inches	7/16	15/32	15/32	17/32	17/32	9/16	9/16
Thickness of Heads ... "	9/16	9/16	9/16	9/16	9/16	9/16	9/16
Thickness of Butt Straps ... "	3/8	3/8	3/8	7/16	7/16	7/16	7/16
Weight of Bare Flush End Boiler ... about	12600	14800	16200	17900	19900	23400	26000
Weight of Bare Boiler and Smoke Box ... about	13200	15500	16900	18700	20700	24300	26900

For list of Full and Half Front Fixtures, see Page 11, the Valves and Gauges being of high-grade make, for 150 lbs. pressure.

Horizontal Seams, Butt strapped, Quadruple Riveted; Heads braced with Weldless Steel Crow Foot braces above Tubes and through braces below Tubes, with Crow Foot at rear end and double nuts at front end, the outside nuts being steel cap nuts; Man Hole in Shell, with pressed steel frame, double riveted; Flanged Man Hole in Front Head below Tubes, each 11 inch x 15 inch, with pressed steel plate complete; Eight pressed steel Wall Brackets riveted on, four on each side in pairs; Shell made in two circular courses in all sizes; Rivet holes drilled from the solid as described on Page 19; Tube holes punched ½ inch small and reamed to size; Shell of Fire Box Steel, Heads of Flange Steel; Pressed steel threaded flange for Steam, Safety Valve and Blow-off Connection and Tapped Openings for Water Column Connection; Dry Pipe fitted under steam Outlet; Brass Bushing in Front Head with internal Feed Pipe installed; Fusible Plug in Rear Head.

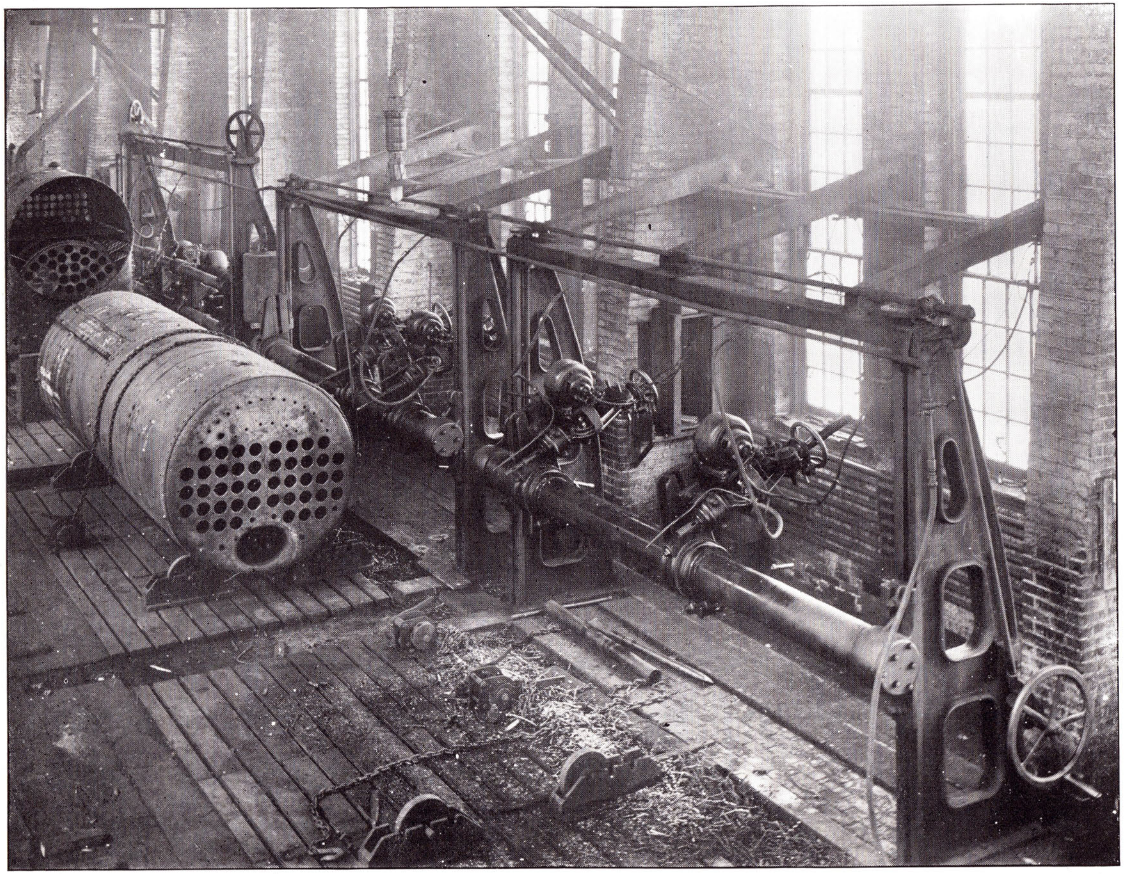
The above described Boilers will pass inspection in the States of Massachusetts and Ohio and the City of Detroit, Mich., the necessary Data Sheets being registered as required by their Rules.

When desired to use these Boilers with Half Front Setting, we will bolt to the Front Head a Smoke Box of ¼ inch steel, with ¼ inch Steel Door (Cut No. 2, Page 29), and Stack Saddle (Cut No. 4, Page 29), and furnish a Half Front in place of Full Front, Wall Brackets being furnished with either Full or Half Front Setting.

Domes are not furnished except to order.

For Overhead Suspension, see Page 30.

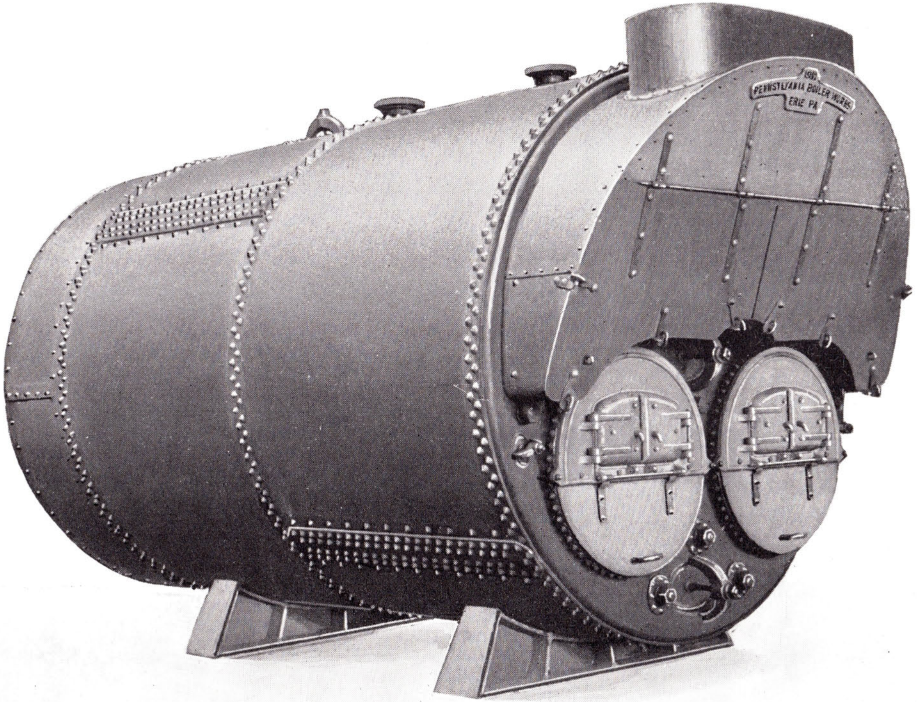
For change in number and size of Tubes, see Page 15.



This cut represents a battery of rivet hole drilling machines designed for drilling rivet holes out of the solid with all members in place. This method is the best method of preparing rivet holes and is employed in the construction of Boilers specified on Pages 16, 17, 18, 20 and 21, on all Fire Door Openings, and on all wrot mud rings.

The Marine Laws of our Government require that **"All Boilers built for marine purposes shall be required to have the rivet holes in the shells, the heads and flanges of same, steam and mud drums, and holes for stay bolts and tubes fairly drilled and no part of such hole shall be punched."**

This method is superior to that required by all of the Municipalities and States who have, up to the present time, passed laws covering the construction of boilers, and who permit the punching of the holes smaller than required, then reaming to full size; very few boiler factories engaged in the manufacture of boilers for land use are equipped to prepare rivet holes in this way, and, had the Municipalities and States mentioned required the work done in this way, it would have necessitated the expenditure of a large sum of money by the land boiler manufacturers for necessary machinery, and would have further increased the cost of boilers to the consumers in the Municipalities and States mentioned.


PENNSYLVANIA BOILER WORKS
ERIE PA

INTERNAL FURNACE BOILERS

With Corrugated Furnaces.

SPECIFICATIONS OF INTERNAL FURNACE BOILERS,

WITH CORRUGATED FURNACES.

Cipher to designate for 130 lbs. working pressure.....	LACE	LADY	LAIR	LAND	LAP	LARD	LASS	LAVA	LAWN
Cipher to designate for 160 lbs. working pressure.....	LICK	LID	LIFE	LILAC	LISP	LIME	LINK	LIVER	LIZARD
Horse Power (as usually rated)......................	**75**	**100**	**125**	**150**	**200**	**250**	**250**	**300**	**300**
Diameter of Boiler..........................inches	**78**	**84**	**90**	**96**	**114**	**126**	**120**	**138**	**129**
Length of Furnace and Tubes........................	11′-6″	12′-6″	12′-6″	13′-0″	12′-6″	12′-6″	16′-0″	13′-0″	16′-0″
Inside Diameter of Furnace...................inches	36	38	45	50	38	45	41	50	45
Number of 3½-inch Tubes...........................	42	56	70	80	108	137	—	161	—
Number of 4-inch Tubes.............................	—	—	—	—	—	—	104	—	127
Square Feet of Heating Surface......................	527	733	905	1071	1423	1780	2004	2157	2403
Square Feet of Grate Surface........................	15	20	25	30	40	50	50	60	60
Length of Grates..............................inches	60	76	80	87	76	80	88	87	96
Thickness of Shell 130 lbs. Pressure............. “	1/2	17/32	9/16	5/8	23/32	13/16	3/4	7/8	13/16
Thickness of Heads 130 lbs. Pressure............ “	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8
Thickness of Furnace 130 lbs. Pressure.......... “	11/32	11/32	13/32	7/16	11/32	13/32	3/8	7/16	13/32
Thickness of Shell 160 lbs. Pressure............. “	5/8	21/32	23/32	3/4	7/8	31/32	15/16	1 1/16	1
Thickness of Heads 160 lbs. Pressure............ “	11/16	11/16	11/16	11/16	11/16	11/16	11/16	11/16	11/16
Thickness of Furnace 160 lbs. Pressure.......... “	13/32	7/16	1/2	9/16	7/16	1/2	15/32	9/16	1/2
Thickness of Combustion Chamber............. “	1/4	1/4	1/4	1/4	5/16	5/16	5/16	5/16	5/16
Depth of Combustion Chamber................. “	33	39	39	39	39	39	39	39	39
Diameter of Smoke Stack Required............. “	24	28	30	32	34	38	38	42	42
Weight of Bare Boiler 130 lbs. Pressure...............	15300	18500	21000	24900	35500	44000	49000	55500	59000
Weight of Bare Boiler 160 lbs. Pressure...............	17600	21500	25500	28900	42000	51600	57500	64700	69000
Weight of Fixtures, either Pressure..................	2000	2300	2800	3400	4500	5300	5000	6300	6000

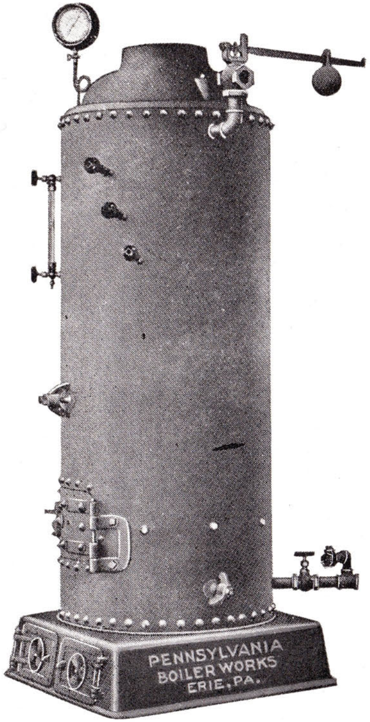
Bare Boilers are regularly supplied with $\frac{3}{16}$ inch Smoke Box as shown in Cut; Combustion Chamber bolted to rear end; intended for 9 inch brick lining (Brick not included) and with Cleaning Out Door near bottom; Cast Iron Front for end of Furnaces, with Fire Door, Liner for Fire Door, Dead Plate for Front Support for Grates and Sheet Iron Ash Door below Front.

Horizontal Seams, Butt Strapped, Triple Riveted; Circular Seams Single Riveted on sizes up to and including 150 H. P., double riveted on larger sizes; One Furnace in sizes up to and including 150 H. P., two in larger sizes; Rivet Holes drilled from solid plate after plates are rolled and bolted together, as described on page 19 (not punched and reamed); Manhole in Shell of all Boilers with pressed Steel Frame and two flanged in Front Head of Boilers having two Furnaces; Two Hand Holes in Front Head of all Boilers.

Heads braced with upset rods (having double nuts and washers) on a basis of 7,500 lbs. strain per square inch of section; outside nuts are steel cap nuts.

Fixtures comprise: Grates with center bearer and support; Bridge Wall at rear of Grate; two Cast Iron Cradles for support, Pop Safety Valve, Water Column attached to Boiler with Steam Gauge, Water Gauge and Gauge Cocks attached, Blow-off Valve, Check Valve and Feed Valve, better quality of valves furnished on the 160 lb. Working Pressure Boilers.

Boilers are tested to 200 lbs. Water and 130 lbs. Steam and 240 lbs. Water and 160 lbs. Steam respectively for the two pressures, and made absolutely tight at the Steam Pressure, minute leaks being detected with a torch.



UPRIGHT TUBULAR STEEL BOILERS

From 4 to 125 Horse Power.

UPRIGHT TUBULAR BOILERS

WITH FULL LENGTH TUBES.

Horse Power	4	5	6
Name or Cipher by which to designate	AKRON	BANGOR	CANTON
Diameter of Boiler in inches	**24**	**24**	**24**
Height of Boiler in feet	4	5	6
Diameter of Fire Box in inches	20	20	20
Height of Fire Box "	24	24	24
Thickness of Steel in Shell "	¼	¼	¼
Thickness of Steel in Fire Box "	¼	¼	¼
Thickness of Steel in Heads "	⅜	⅜	⅜
Length of Tubes "	24	36	48
Number of Tubes (all 2-inch diameter)	28	28	28
Square Feet of Heating Surface	43	58	73
Diameter of Smoke Stack required in inches	10	10	10
Weight of Bare Boiler in pounds	900	1000	1100
Weight of Base and Fixtures "	300	300	300
Weight of Boiler complete in pounds	1200	1300	1400

Fixtures comprise base, grates, hood, steam gauge, water gauge, gauge cocks safety valve, blow-off check and stop valves. Smoke stack will be furnished at additional prices per foot, as quoted in price list.

Bases are of cast iron, and have double ash doors with registers. Cast iron hood is regularly furnished, but we will furnish cone-shaped hood of sheet steel, if so ordered, without additional charge. Cheesebox hood of sheet steel, with removable top and side outlet, will be furnished, if so ordered, at an additional price.

SPECIFICATIONS OF UPRIGHT TUBULAR BOILERS.

WITH FULL LENGTH TUBES.

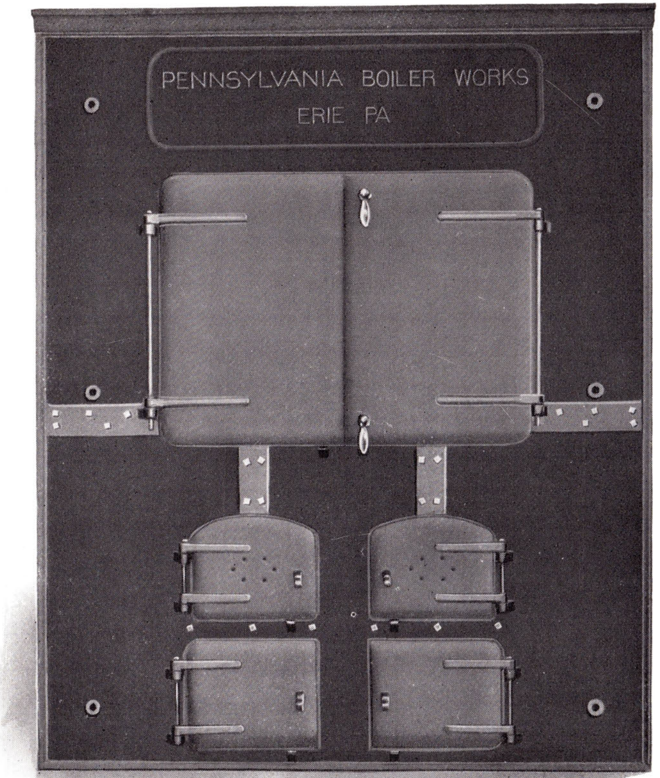
8	10	12	15	18	20	25	30	35	40	45	50	60	70	70	80	90	100	110	125
DALLAS	**ELGIN**	**FARGO**	**GENEVA**	**HOBOKEN**	**ITHACA**	**JOPLIN**	**KOKOMO**	**LAREDO**	**MACON**	**NEWARK**	**OGDEN**	**PEORIA**	**QUINCY**	**SALEM**	**TACOMA**	**UTICA**	**VERONA**	**WAUSAU**	**YONKERS**
30	**30**	**30**	**36**	**36**	**36**	**42**	**42**	**42**	**48**	**48**	**48**	**54**	**54**	**60**	**60**	**60**	**66**	**66**	**66**
5	6	7	6	7	8	7½	8½	9½	9	9½	10	9	10	9	10	11	10	11	12
25	25	25	31	31	31	37	37	37	43	43	43	48	48	54	54	54	60	60	60
27	27	27	27	27	27	30	30	30	30	30	30	30	30	30	30	30	30	36	36
1/4	1/4	1/4	1/4	1/4	1/4	9/32	9/32	9/32	5/16	5/16	5/16	11/32	11/32	3/8	3/8	3/8	3/8	3/8	3/8
1/4	1/4	1/4	9/32	9/32	9/32	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	11/32	11/32	11/32	11/32	11/32	11/32
3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16
33	45	57	45	57	69	60	72	84	78	84	90	78	90	78	90	96	90	96	108
48	48	48	72	72	72	96	96	96	130	130	130	180	180	212	212	212	270	270	270
89	114	139	167	205	242	287	338	388	486	520	554	662	757	771	883	956	1130	1208	1350
12	12	12	15	15	15	17	17	17	20	20	20	24	24	26	26	26	30	30	30
1400	1550	1700	1900	2150	2400	3000	3350	3700	4200	4500	4800	5500	6000	6800	7400	7800	9000	9500	10400
550	550	550	800	800	800	1000	1000	1000	1600	1600	1600	2100	2100	2500	2500	2500	2800	2800	2800
1950	2100	2250	2700	2950	3200	4000	4350	4700	5800	6100	6400	7600	8100	9300	9900	10300	11800	12300	13200

Boilers 24 inches, 30 inches and 36 inches diameter have two hand-holes in bottom of water leg and one above crown sheet. Boilers 42 inches diameter and larger have three hand-holes in bottom of water leg and three hand-holes above crown sheet.

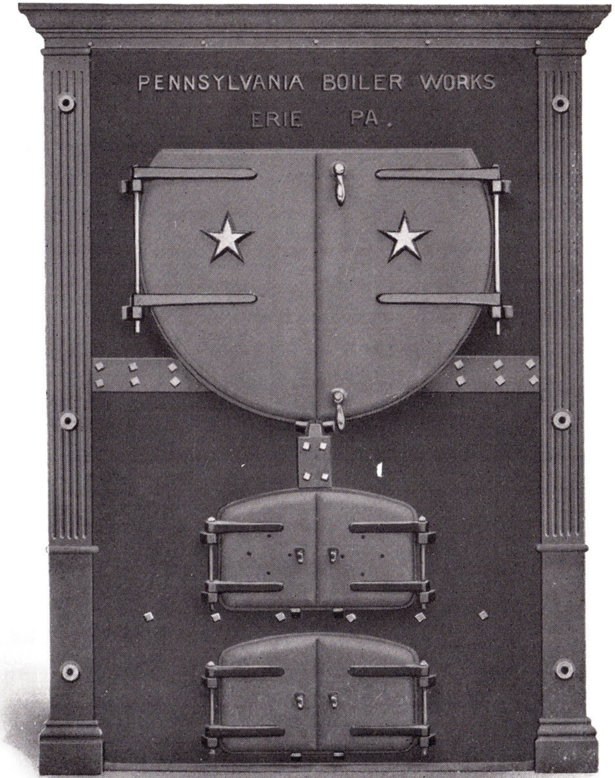
Fire boxes are thoroughly braced with screw stay-bolts.

Longitudinal seams of Shell of Boilers 30 inches diameter and larger are double riveted. Longitudinal seams of Shell of Boilers 24 inches diameter are single riveted. All girth seams and fire box seams are single riveted.

All Boilers tested at 150 pounds hydrostatic pressure and made steam-tight before leaving the Works.



FULL ARCH FRONT "D."

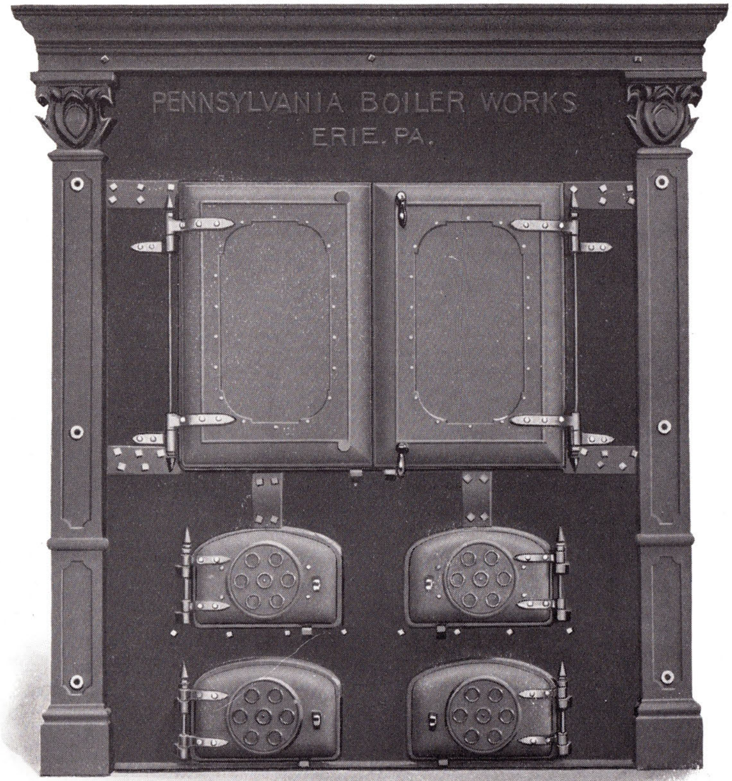


FULL ARCH FRONT "E."

Full Fronts "D" or "E" are regularly furnished with Flush End Boilers. When neither style is specified in order, we will understand choice is left to our discretion.

Both style Fronts from 36 to 54 inch inclusive have Fire and Ash Doors as per cut of Front "E" and on 60 inch and larger as per cut of Front "D" unless otherwise ordered. With the Front is included Dead Plate, Oval Stack Plate, and Fire Door Liners, but Flame or Arch Plate (No. 15, page 24) and Anchor Bolts are not included.

NOTE—When two or more Boilers are ordered with Full Fronts, please state how far apart, center to center, it is the intention to set them, this can be arranged as wanted. In the absence of instructions on this point, we will assume they are set in battery with dividing wall and will arrange 54 inch Boilers 80 inches, 60 inch Boilers 86 inches, 66 inch Boilers 96 inches, 72 inch Boilers 102 inches, and 78 inch Boilers 108 inches apart center to center.

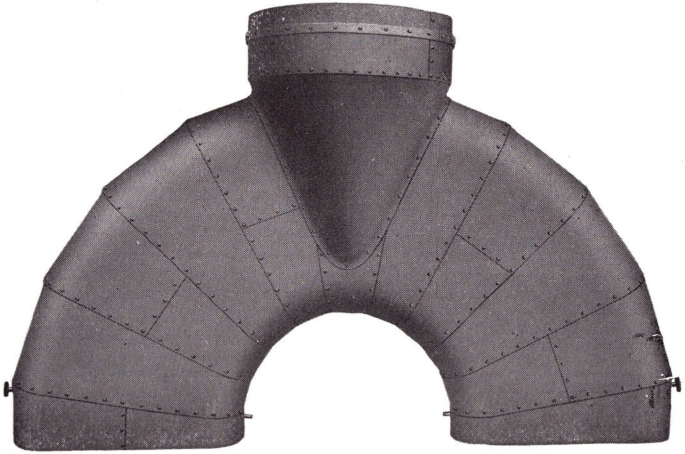


ORNAMENTAL FULL FRONT "F"

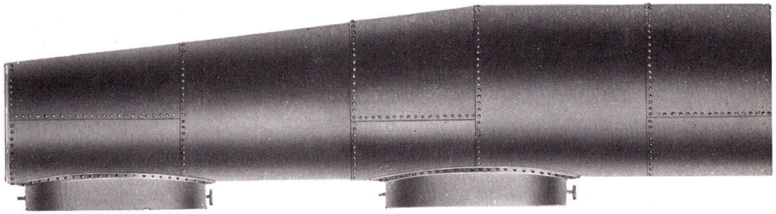
Above cut represents our ornamental Full Front. Very much heavier, and more ornamental then "D" and "E".

This style has been installed by us in a number of U. S. Government Buildings.

This Front will be furnished, when ordered, in place of "D" and "E" and at an additional price.



NO. 1 IS INTENDED FOR TWO BOILERS ONLY.

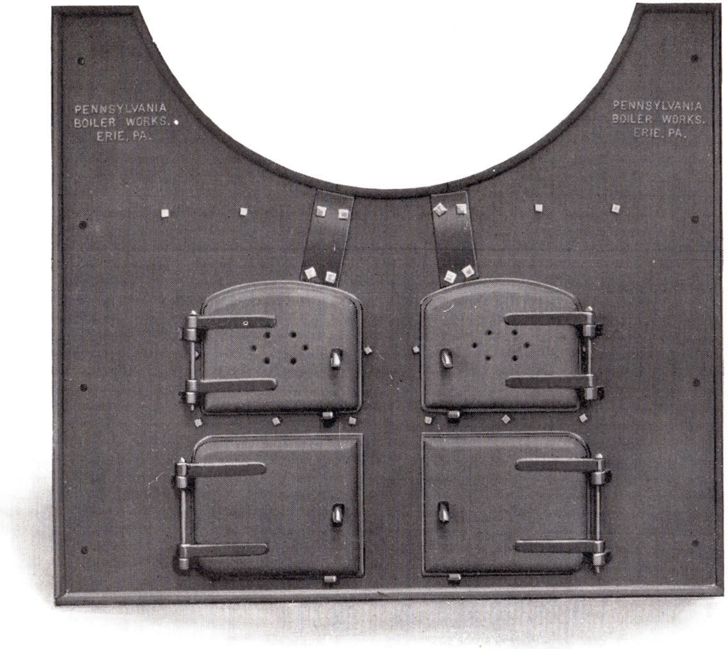


NO. 2 IS INTENDED FOR TWO OR MORE BOILERS.

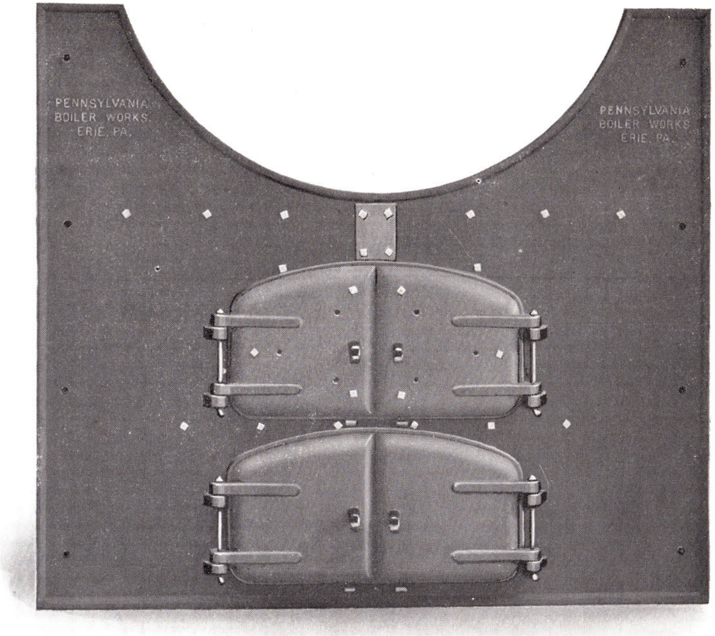
SMOKE CONNECTIONS.

Smoke Connections, as regularly furnished, will be made of **No. 14 Steel** for **48** and **54** inch Boilers, and of **No 12 Steel** for **larger Boilers** and the Center to Center measurements of uptakes in accordance with Note * on preceding page.

No. 2 Smoke Connection, as regularly furnished, will be long enough to carry the outlet end two feet beyond brick walls of boiler.


PENNSYLVANIA
BOILER WORKS.
ERIE, PA.
PENNSYLVANIA
BOILER WORKS.
ERIE, PA.

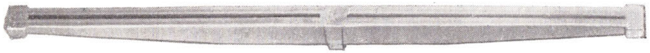
HALF ARCH FRONT "C."


PENNSYLVANIA
BOILER WORKS.
ERIE, PA.
PENNSYLVANIA
BOILER WORKS.
ERIE, PA.

HALF ARCH FRONT "B."

Will furnish Front "B" with 36—42 and 44-inch Boilers, and either Front "B" or "C" with larger Boilers; when neither is specified, Front "C" will be furnished.

No. 1.



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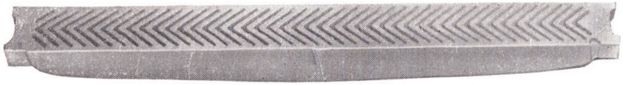

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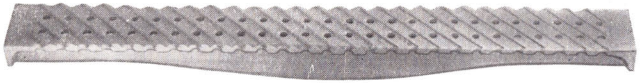
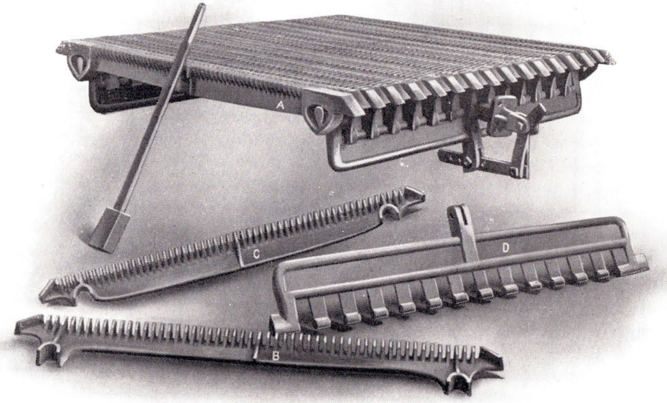




No. 4.

Grate No. 1 will be furnished unless otherwise ordered. No. 2 or No. 3 will be furnished at the same price. No. 3 is intended for Saw Dust only.

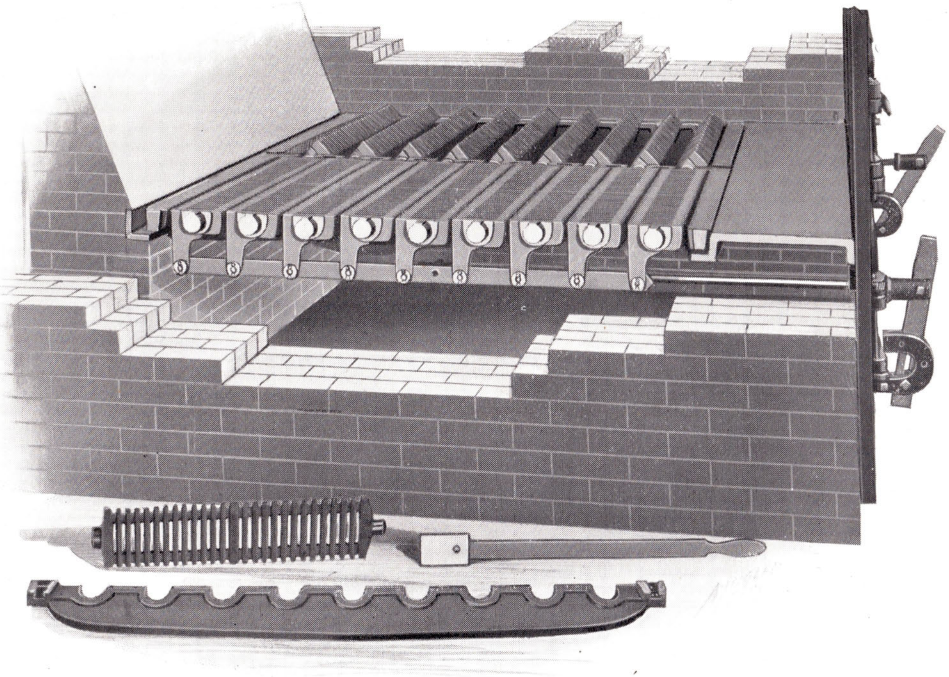
The Shaking Grate No. 4, illustrated, is made up of two or more side bars (depending on the width of surface), "A," which are stationary. In these side bars, at each end, are pockets for the reception of the Rocker Bars, "D," which swing on pivot edges like a scale bearing, in said pockets. To the front Rocker Bar is attached the operating Levers, which are also attached to the Boiler Front. On the Rocker Bars rest the moving Grate Bars "C" and "B."

The movement of the Bars is both vertical and horizontal, each Bar moving in the opposite direction from the movement of the Bar next to it. This is done with very little effort on the part of the operator and thoroughly cleans the under-surface of the fire.

These Bars are very simple in construction and not liable to get out of order, have from 50 to 60 per cent. of air space, and are very durable.

The advantages they possess over the stationary Grate is, that having a larger air space they attain nearer perfect combustion, the fire can be kept clean without the constant poking and raking through the fire doors which admit cold air to the furnace, which is detrimental to economy.

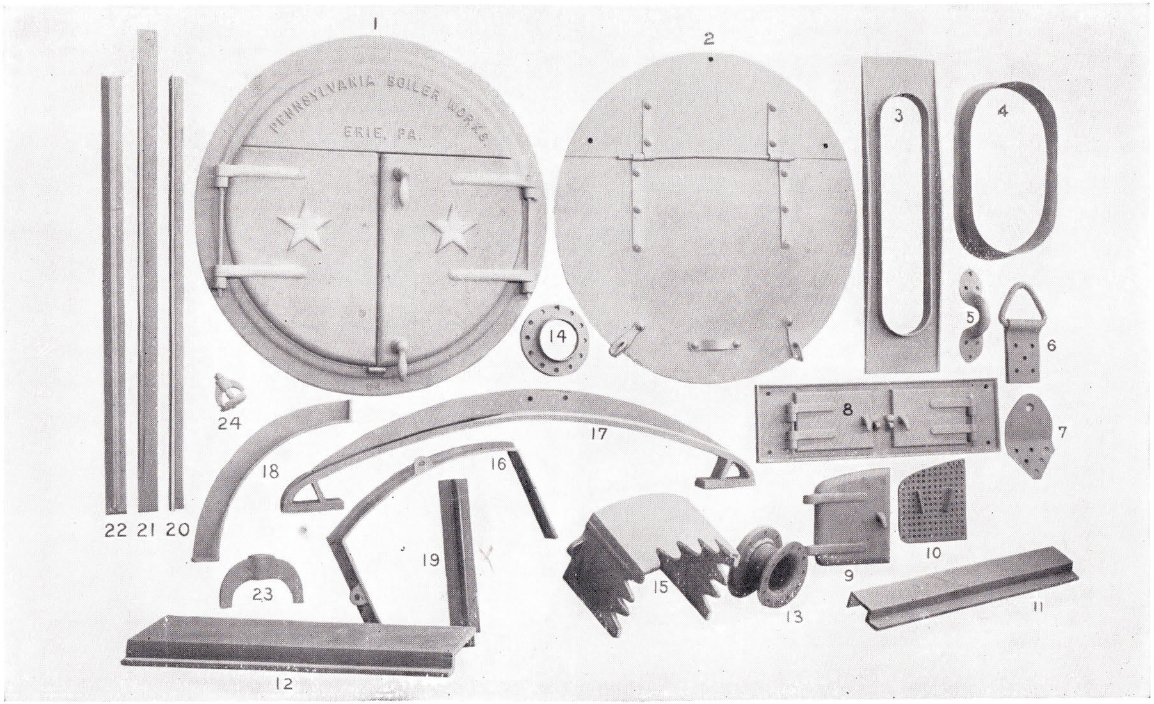
They will soon pay for their extra cost over the common grate in the fuel saving.



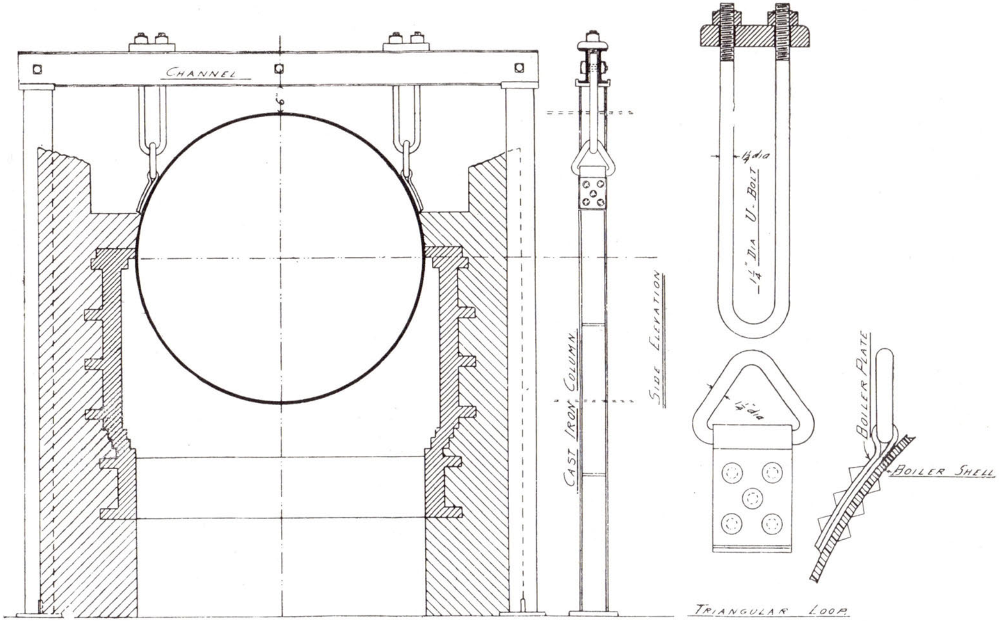
No. 6 ROCKING AND DUMPING GRATE.

The above Cut illustrates a design added to our extensive line and, we believe, will give uniform satisfaction where a rocking and dumping grate is desired.

The object of this page is to better describe some terms used in boiler nomenclature.



No. 1—Cast Iron Smoke Box Frame and Doors opening right and left.
No. 2—¼ inch Steel Smoke Box Door opening up.
No. 3—Cast Iron Oval Stack Plate for Full Front.
No. 4—Steel Smoke Stack Saddle used on smoke box of half-front boilers.
No. 5—Pressed Steel Loop for top of Boiler used for suspending boilers.
No. 6—Triangular Loop for side of Boiler used for suspending boilers.
No. 7—Plate Steel Loop or Ear for side of Boiler used for suspending boilers.
No. 8—Ash Pit Frame and Doors for Open Bottom Fire Box Boilers.
No. 9—Cast Iron Fire Door for Full or Half-Front.
No. 10—Perforated Cast Iron Liner for Fire Door.
No. 11—Dead Plate for Half-Arch Front.
No. 12—Dead Plate for Full-Arch Front.
No. 13—Combination Nozzle, consisting of pressed steel threaded flange, extra heavy nipple, and faced and drilled heavy cast iron flange, all securely screwed together.
No. 14—Pressed Steel Flange.
No. 15—Arch Plate, sometimes termed Casings, or Flame Plate, 14 inches deep, for supporting fire brick around fire doors of full fronts.
No. 16—Arch plate or Casing, for supporting one course of brick around fire door openings on half fronts.
No. 17—Rear Arch Bar, Hartford Pattern, for lining with Fire Brick.
No. 18—Rear Arch Bar, Curved Pattern, to rest on Back Wall.
No. 19—Rear Arch Bar, Straight Pattern.
No. 20—Bearing Bar, Rear End Grates.
No. 21—Bearing Bar, for Rear Arch.
No. 22—Bearing Bar, for Center of Grates.
No. 23—Man Hole Bridge.
No. 24—Hand Hole Plate, Bolt and Bridge complete.



OVERHEAD SUSPENSION FOR TUBULAR BOILERS.

SINGLE BOILER (Per Cut).

Diam. of Boiler	60″	66″	72″	78″
4 C. I. Columns	10′-0″ High	10′-6″ High	11′-0″ High	11′-6″ High
*4 Steel Ch.....	6″x9′-4″x13	8″x10′-6″x16¼	10″x11′-0″x20	10″x11′-6″x20
4 U Bolts......	1¼″x30″	1¼″x30″	1¼″x30″	1½″x36″
Weight comp'te	2100	2350	2680	2800

SINGLE BOILER—Channels Resting on Walls, (No Columns).

Diam. of Boiler	60″	66″	72″	78″
*4 Steel Ch.....	6″x8′-4″x13	8″x9′6-″x16¼	10″x10′-0″x20	10″x10′-6″x20
4 U Bolts......	1¼″x30″	1¼″x30″	1¼″x30″	1½″x36″
Weight, lbs....	670	850	1000	1150

BATTERY SETTING. (Add for each additional Boiler).

Diam. of Boiler	60″	66″	72″	78″
2 C. I. Columns	10′-0″ High	10′-6″ High	11′-0″ High	11′-6″ High
*4 Steel Ch.....	6″x7′-2″x13	8″x8′-0″x16¼	10″x8′-6″x20	10″x9′-0″x20
4 U Bolts......	1¼″x30″	1¼″x30″	1¼″x30″	1½″x36″
Boiler Centers.	86″	96″	102″	108″
Weight........	1300	1450	1650	1800

BATTERY SETTING. (Add for each additional Boiler).

Diam. of Boiler	60″	66″	72″	78″
*4 Steel Ch.....	6″x7′-2″x13	8″x8′-0″x16¼	10″x8′-6″x20	10″x9′-0″x20
4 U Bolts......	1¼″x30″	1¼″x30″	1¼″x30″	1½″x36″
Boiler Centers.	86″	96″	102″	108″
Weight, lbs....	600	800	900	1000

Cast Iron Columns above are 5x7 inches, I Beam Section, strongly ribbed, with base and cap cast integral and weigh about 35 lbs. per foot.

Can furnish Steel I Beam Columns in place of Cast Iron, 6-inch weighing 12¼ lbs. per foot for 60, 66 and 72-inch, and 7-inch weighing 15 lbs. per foot for 78 inch with angles riveted on for base and cap.

*Last dimension of Steel Channel is weight per foot in pounds.

SPECIFICATIONS OF TANKS.

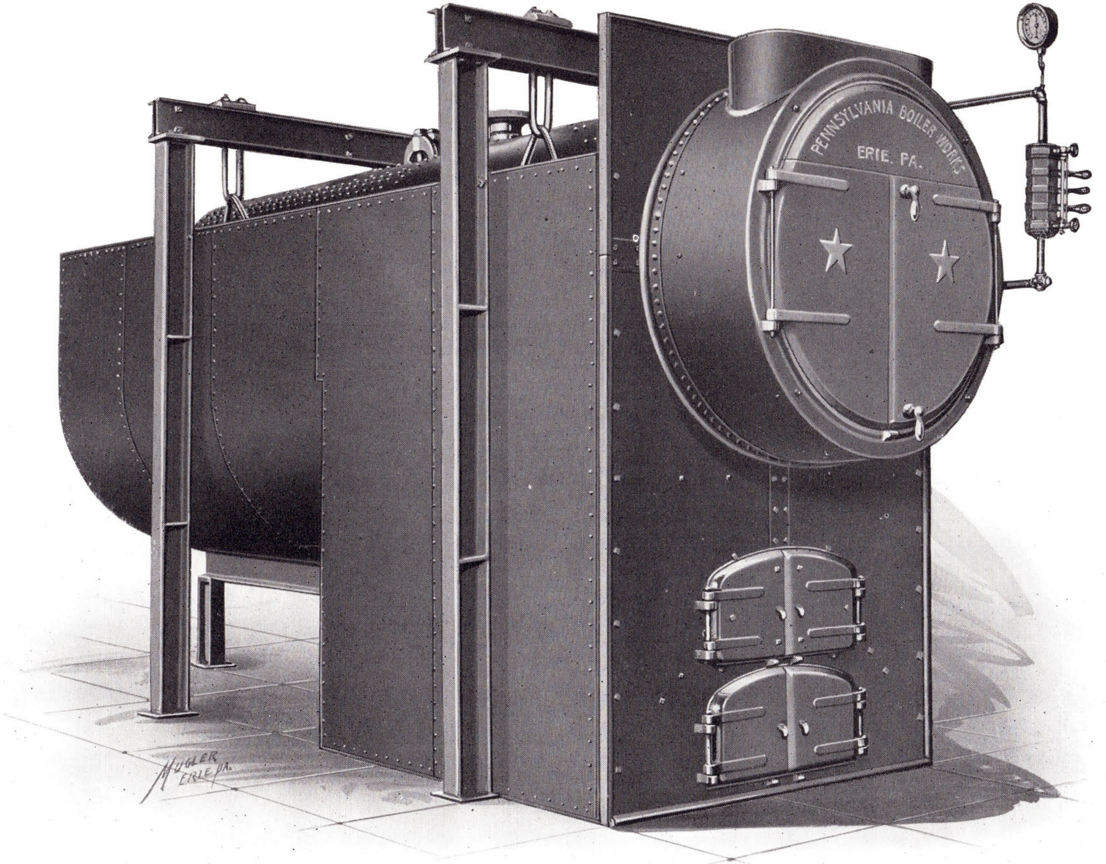
Diameter........................inches	18	20	24	30	36	36	42	42	48	48	54
Length.............................feet	5	5	5	6	6	8	8	10	10	12	12
Thickness Shell....................inches	3/16	3/16	¼	¼	¼	¼	¼	¼	¼	¼	5/16
Thickness Heads.................. "	¼	¼	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	7/16
Size Inlet and Outlet opening....... "	2	2	2	3	3½	4	4	5	6	6	6
Size Safety Valve opening.......... "	¾	¾	1	1¼	1½	1½	1½	2	2	2	2½
Weight.............................lbs.	275	300	520	730	930	1200	1420	1630	2000	2300	3000
Cubic Contents Feet.....................	9	11	16	30	42	57	77	96	126	150	191
Capacity in Gal. 231 Cubic inches per Gal.	66	100	117	221	318	424	572	716	942	1131	1428

Above Tanks are also supplied with pressure gauge and drain openings. No Man holes. Are usually placed upright, but can be used horizontally.

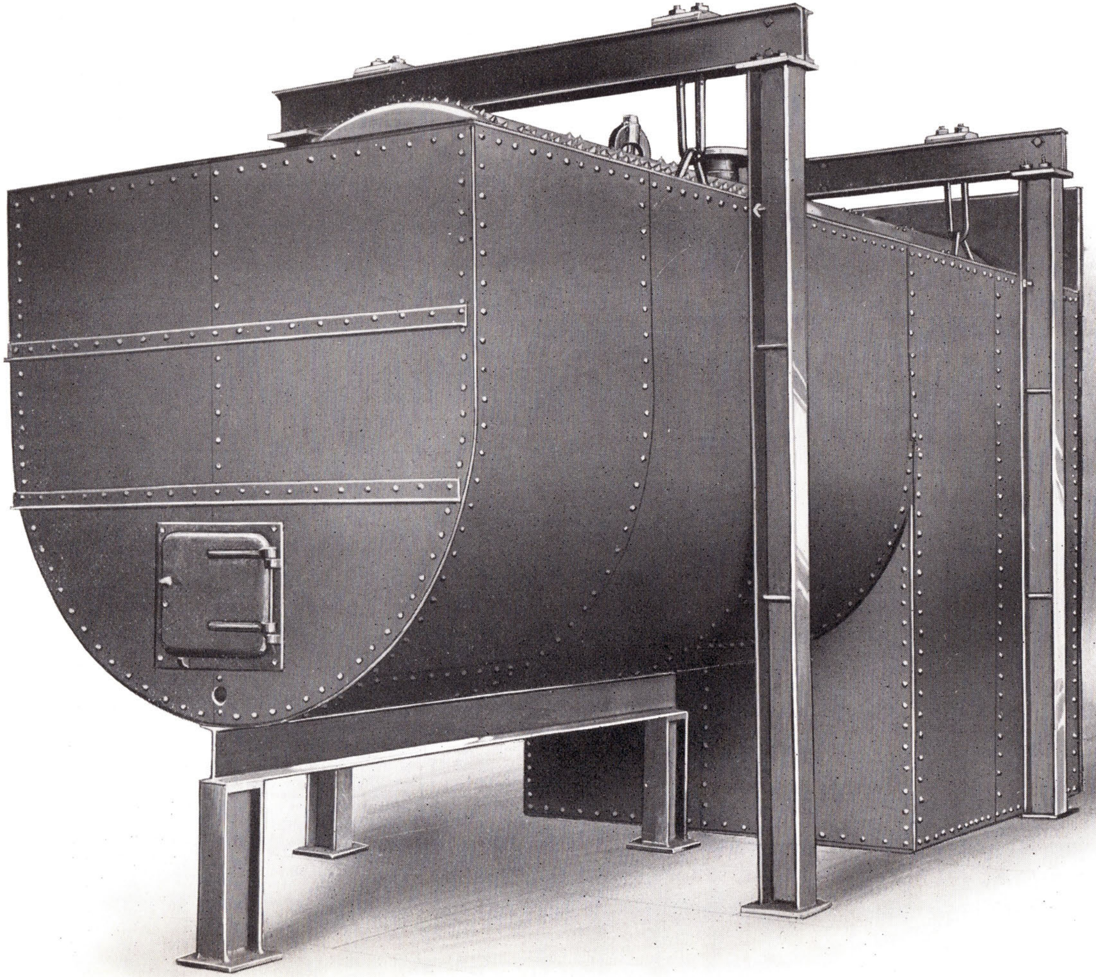
We will endeavor to have above sizes in stock, other sizes quoted on application.

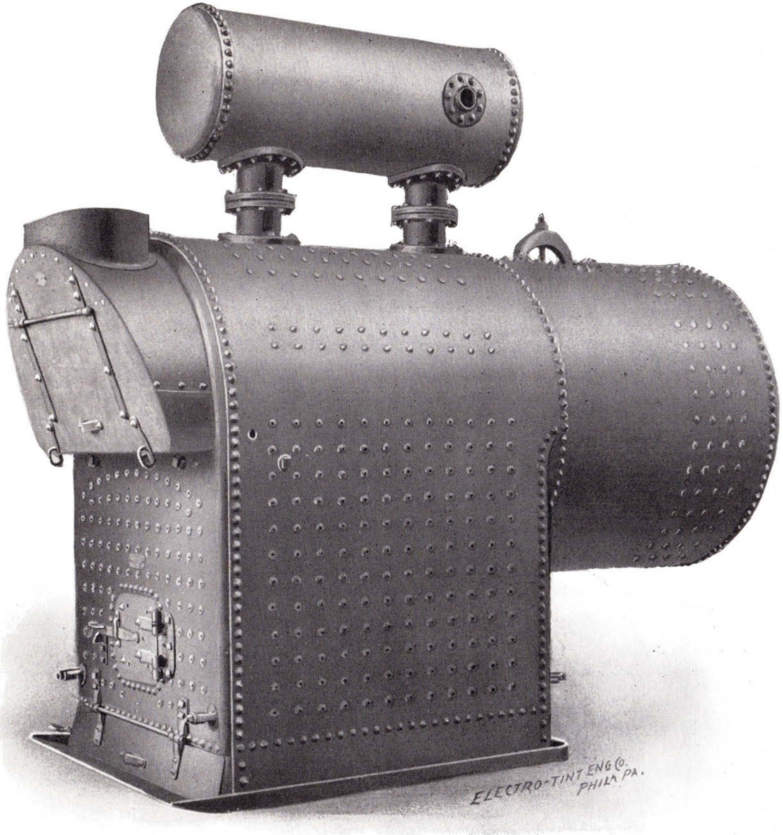
When so ordered will furnish above with Man hole in head on sizes above 24-inch diameter, or in Shell above 30-inch diameter, at an additional price.

We are pleased to submit prices on Storage Tanks, Cylindrical, Round or Rectangular, and Hydro-Pneumatic to customers specifications.


PENNSYLVANIA BOILER WORKS
ERIE, PA.
MUGLER ERIE PA.

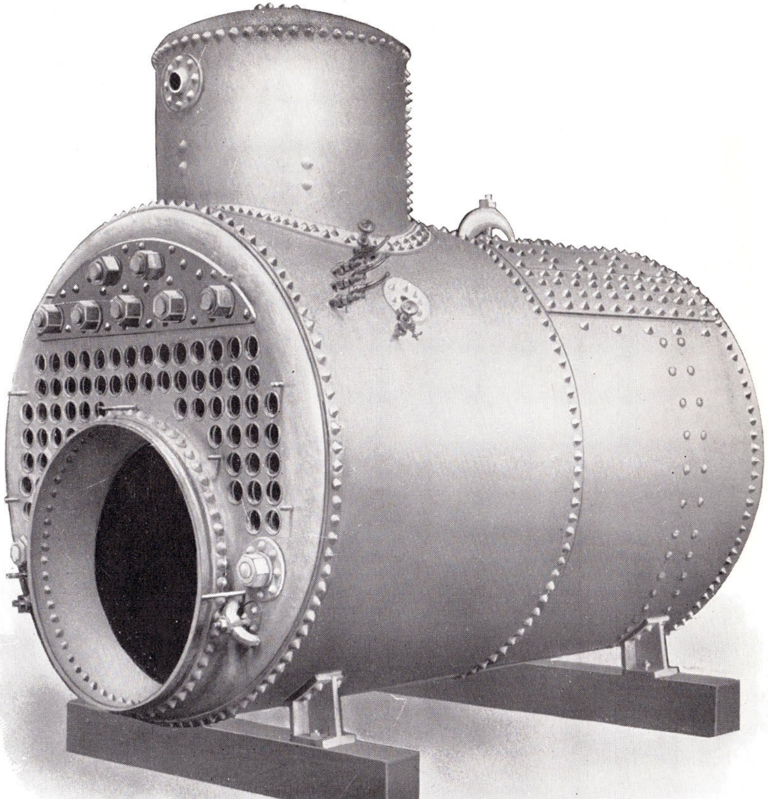
The above Cut and that on the next page illustrates a Steel Casing Setting which can be used on the various sizes of Stationary Boilers, and effects a saving in the number of brick required, dispensing entirely with red brick. It can be used with any of the various types of setting employed with brick set Boilers, Half Front, Full Front or Dutch Oven Front, singly or in battery. We have no particular design to offer, having built them to order in various designs, and are prepared to quote on this according to customers' ideas and requirements.




ELECTRO-TINT ENG CO. PHILA PA.

FIRE BOX MARINE BOILER.

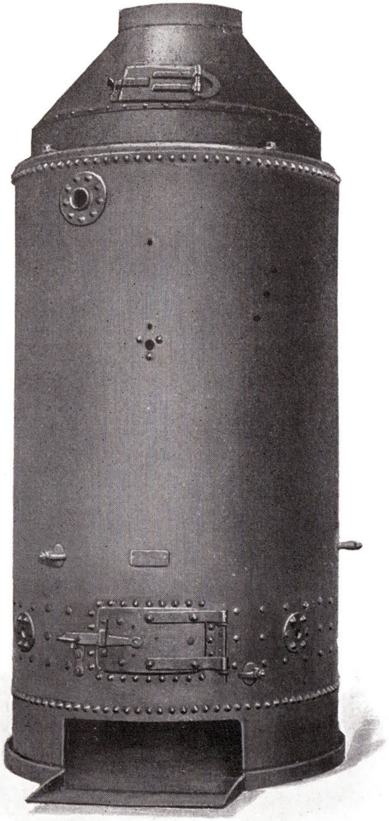
With Return Flues and Water Back.

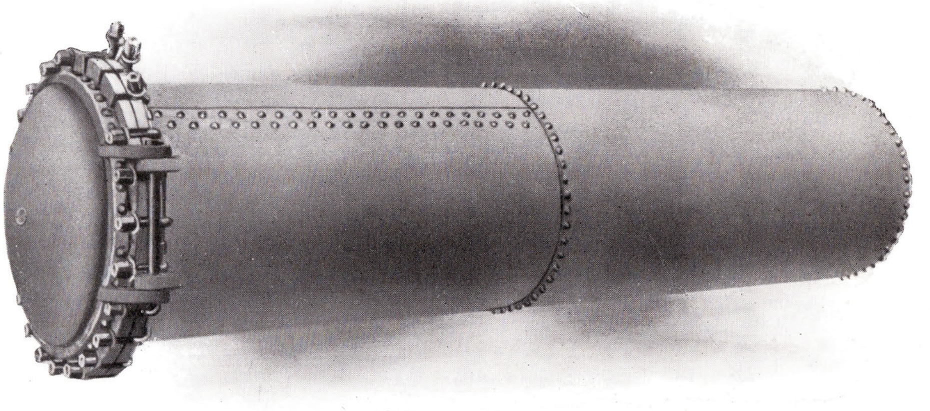


SCOTCH MARINE BOILER, FOR TUG BOAT.

With Smoke Box and Furnace Front Removed.

Marine Boilers are built in such a variety of types and sizes, and the requirements of the U. S. Marine Laws are such that it is absolutely necessary that Boilers for this purpose be built to order, and in fact the plates for them have to be made to order, so we do not list such Boilers. We are, nevertheless, building Marine Boilers and will be pleased to submit prices, if favored with a general outline of what is required. We are familiar with the Laws governing their construction, and are able to guarantee customers they will pass the Marine Inspection for the pressure required.





VULCANIZER, OR DRYER.

With Hinged Entrance Door and Swinging Bolts.

We are pleased to name prices on Special Boiler, Tank and Stack Work on receipt of specifications.

UPRIGHT MARINE BOILER.

RULES FOR THE OPERATION AND CARE OF STEAM BOILERS

As Recommended by a Committee of The American Society of Mechanical Engineers.

Persons Having the Care of Boilers Should Remember That Explosions or Other Accidents are Often Due to Lack of Care on the Part of Attendants. The Careful Observance of the Following Rules Will Go Far to Prolong the Life of Boilers and to Prevent Casualties.

1. Water Level. The first duty on entering the boiler room is to ascertain whether the valves and connections between the boiler and the water column are free and open. Then blow down the water column noting the return of the water in the glass, and try the gauge cocks until sure of the water level. This should be done at the beginning and end of each watch and also several times during the day. Have the water column well lighted and keep the glass gauge clean. Keep the gauge cocks in good order, and use them frequently as glass gauges are unreliable. Do not depend upon automatic waterfeeders. Keep the feed pump in good order. Place a pump relief valve in the feedwater line to prevent possible accidents from excessive water pressure. Do not allow steam to leak or be drawn from the water column or its connections as this will cause the gauge glass to show a false water level. This applies to injectors, tube cleaners, and other apparatus requiring actual flow of steam, but it does not apply to the steam gauge which requires no such flow, and which may properly be attached to the water column. Put tees or crosses at the bend of both pipes from boiler to water column; remove the plugs and clean these pipes when washing out the boiler.

2. In the case of hot water heating boilers, the steam gauge shows the height of water in the system in pounds pressure. Before starting up, go to the expansion tank under the roof and see that the water is at the correct height in the tank. Then return to the boiler and make a mark with red paint on the steam gauge where the needle stands. Use this mark as a guide in filling the boiler. The needle should stand at this mark when the boiler is in service. If the boiler is provided with an altitude gauge the gauge should be tested by noting its reading when the water is at the correct height in the expansion tank. In hot water systems no valves should be allowed in the pipes leading to or from the boiler and heating system, except radiator valves. If such valves are in have them removed, for if the valves are inadvertently closed an explosion will occur. An explosion of a hot water heating boiler will also occur if it is not directly open to the atmosphere through the expansion tank. No safety valves are required on hot water boilers open to the atmosphere through the expansion tank.

3. Leaks. Open each door to boiler at least once a day and look carefully for leaks at every possible point, noting tube ends and riveted seams, and blow-off pipes in furnace. Examine carefully the fire sheets for cracks, bulges, bags or blisters. In the case of cast-iron boilers look out for fractures also. Do not assume any defect safe. A dangerous lap seam crack may allow only a very slight leak. Do not attempt to make repairs while the boiler is under pressure, but send at once for an inspector or for a competent boilermaker.

4. Getting Up Steam. When the boiler has been emptied water should not be fed into it again until after it has become cold. See that the manhole and all handhole gasket joints are tight, and that the boiler is vented to permit the air to escape while the boiler is being filled. Make certain that the proper water level has been reached before starting the fires, and start them early enough to reach normal working pressure at the required hour without having to resort to forced firing. If gas or oil fuel is used see that the furnace is thoroughly ventilated before attempting to start the fire. Never turn on the fuel supply either when starting up or after a lighted jet has gone out without first placing in the furnace a lighted torch or a piece of burning waste to ignite the fuel instantly. Failure to observe this rule may cause a gas explosion as disastrous as a boiler explosion.

5. Cutting in Boilers. When a boiler is to be connected with others already in service keep its stop-valve closed until its pressure is exactly the same as the pressure in the steam main. Then drain the main of any accumulated water and cautiously open the stop-valve a bare crack, first opening the small by-pass valve if one has been provided. If there is no trembling of the pipes or any unusual disturbance slowly increase the opening until the valve is full open. Watch for water of condensation in the pipes, as it may produce violent water hammer that will break the pipe or fittings and cause serious personal injuries.

6. LOW WATER. In case of low water, cover the fire with wet ashes or green fuel. Close ash doors and open fire doors. If oil or gas is used as fuel shut off the supply. Do not touch safety valve. Do not turn on the feedwater. Do not disturb the steam outlets. Do not do anything until the boiler has been cooled off. Then examine it carefully to determine what damage has been done.

7. FOAMING. In case of foaming or priming close the stop-valve long enough to determine the true water level. If the level is high enough try blowing and feeding. If the foaming continues check the furnace draft or shut off the fuel supply, if oil or gas is used, and use the surface blow-off freely. If the foaming, or priming does not stop shut down the boiler, ascertain the cause of the trouble, and take the necessary steps to prevent its recurrence.

8. SAFETY VALVES. See that there is no valve or any other obstruction between the safety valve and the boiler, that the discharge outlet is full size of valve opening, and that the valve is so arranged that no one may be scalded by its discharge. Lubricate the valve with cylinder oil. Attach a small wire cable to safety valve lever and carry the end over a pulley to a point within convenient reach. Lift the valve several times daily to prevent it from sticking to its seat. See that the safety valve is blowing freely when the steam gauge registers the stipulated pressure allowed in the latest inspection certificate. If it does not, ascertain at once why not, bearing in mind that often safety valves are more accurate than steam gauges.

9. BLOWING OFF. Blow down two gauges of water once or twice a day preferably before starting up in the morning and after noon hour. When surface blow-cocks are used they should be opened often but only for a few moments at a time. Blow-off cocks should be opened and closed slowly in order to avoid danger from water hammer. The blow-off pipe should be extra heavy with steel elbows, and should be protected from the direct fire either by a V-shaped brick pier, or by an asbestos covering. If the boiler is provided with a rear handhole the cast-iron arch or crab should be protected by an asbestos covering.

10. GREASE. Cylinder oil and grease should be kept out of boilers. It forms a varnish that prevents the water from coming in contact, with the boiler plate, and thus allows the plate to become overheated causing a burning or blistering that may result in a bad rupture or a disastrous explosion.

11. OPERATING. Fire lightly and frequently and endeavor by all means to save fuel for your employer. Stop up any cracks that may develop in the brick work, as the entrance of cold air through them will cause a waste of fuel. Endeavor to carry a uniform water level and keep all appliances in good working order and as neat as possible.

12. BANKING FIRES. Clean the fires before banking them. Bank them in front of the furnace door and cover them with fresh fuel. Close the ashpit doors. Leave the fire doors open a bare crack and open the damper slightly to prevent an accumulation and a possible explosion of furnace gas.

13. SCALE PREVENTION. Scale should not be allowed to accumulate in the boiler as it is almost certain to cause a bag or rupture or violent explosion. When the feedwater contains much scale forming matter it is good practice to remove it by chemically treating the water before feeding it into the boiler. If this be impracticable then inject a solution of soda-ash into the boiler, and use the blow-off as per instructions in Paragraph 9. A small quantity of kerosene fed continuously into the boiler is sometimes beneficial in softening the scale, but if kerosene be used care must be exercised to eliminate it and its fumes when the boiler is shut down, as otherwise anyone entering the boiler might be overcome by the fumes, or be seriously injured by an explosion should a candle or other exposed light be employed. If soda-ash or other solvent be used and the boiler is badly scaled care must be exercised to open the boiler and remove the dislodged scale massed on the plates, for if it be allowed to remain there a bag or rupture is almost inevitable.

14. SHUTTING DOWN. Boilers should be opened for cleaning and inspection once a month, and more often if the feedwater is bad. To shut down, allow the fire to die out, and remove the ashes and unburned fuel from the furnace. Then closing the fire doors and opening the ash doors and damper, to permit a circulation of air, allow the boiler to cool off for 12 hours or until the steam gauge registers zero when the water

may be run out by opening the blow-off valve and venting the boiler. Boilers are sometimes emptied under pressure, but this should never be done until the pressure has dropped below 10 lbs., and even then the practice is bad, as heat from the furnace walls subject the boiler to severe internal stresses, and causes the scale to be baked so hard as to make its removal difficult.

15. DISLODGING SCALE. After the boiler has been thoroughly cooled and emptied remove the upper manhole and use vigorously a large hose with ample pressure to dislodge loose scale and wash out boiler thoroughly. Then remove the lower manhole and all handhole plates and entering the boiler, remove the accumulated scale from tubes and plates, and from the turn of the flanges, and see that every part of the boiler from head to head is free of scale and cleaned thoroughly both internally and externally. See also that the furnace is cleaned out from end to end. In water tube boilers the lower three rows of tubes, or the tubes nearest the fire require cleaning more often than the remaining tubes.

16. INSPECTION AND REPAIRS. Examine carefully all parts of the boiler for defects, particularly those parts subjected to the direct heat of the furnace. See that any leakage at tube ends or elsewhere is stopped immediately and that any bag, blister, or other defect on tubes or plates is repaired at once. If it be necessary to patch the bottom sheet of a horizontal tubular boiler see that the patch is put on the inside in order to avoid forming a pocket in which the scale may lodge. This can be accomplished by making the patch oblong so that the short diameter of the patch may be put through the long diameter of the hole in the boiler. It is, of course, necessary that the riveting in the patch be as strong as the riveting in the boiler. In making hydrostatic tests do not apply a pressure in excess of one and one-third the normal working pressure carried on the boiler. When the inspector is expected, have the steam gage ready for testing, water column and connections open for examination and everything in readiness to facilitate a thorough-going inspection of the boiler and all of its appurtenances; and be ready to discuss intelligently with the inspector questions involving the safe and economical operation of the boilers.

No boiler or pressure vessel should be allowed to leak about any joint or tube end, since with the mild steels used to-day, such leakage very rapidly deteriorates the vessel in question. Boiler compounds should be used with the greatest care. Pit corrosion may be retarded by the use of water circulators, actuated by the ingoing feed to the boilers, and also by the ample use of rolled zinc plates, zinc paint or graphite paint constantly applied and looked after. In the connection of zinc plates, they should be securely and solidly bolted to the part of the boiler or pressure vessel, so that the electrical contact may be good. (The above refers to Scotch marine boilers and other types having poor circulation in portions of water storage space.)

17. LAYING UP BOILERS. If the boiler is used for heating and is to be laid up during the summer, open the air vents to all radiators and drain them of all water. Then empty the boiler and clean it, dry it thoroughly both internally and externally being sure to remove the accumulated scale. Get some linseed oil and paint all surfaces exposed to the fire. Leave the boiler open to allow a circulation of air. If it be a damp place put a pan of unslacked lime in the boiler to absorb the moisture.